The Dock & Harbour Authority

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The Dock & Harbour Authority

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Editorial Comments

The Port of Blyth.

Situated on the north-east coast of England, some sixteen miles from Newcastle, the Port of Blyth owes its importance chiefly to its growth as a centre for the export of coal from the extensive coal fields of Northumberland. The port has, however, had a long and chequered history, as will be seen from the article to be found on a following page.

Although the port is controlled by an independent authority, the Blyth Harbour Commission, it provides an interesting example of efficient working under the combined management of the Commission, the National Coal Board and British Railways. This typically English method of port administration has evolved over a period of time.

O.E.E.C. Report.

In this issue will be found a full summary of the second report of the Maritime Transport Committee of the Organisation for European Economic Co-operation, or O.E.E.C., as it is commonly known. It is an interesting and comprehensive document on the economic situation in maritime transport during 1955, fully annotated and complete with statistical tables and graphs. If the committee make no recommendations, it is obviously because of the complexity of the matters with which the report deals. On flags of convenience, for example, the committee " is continuing to give the matter close attention," and welcomes the careful study the subject is receiving in several countries. As has been recognised by British shipowners there is no international bar, constitutional or legal, before which those who have adopted the practice could be arraigned; and, indeed, the fact that the United Kingdom is being used, in effect, as a flag of convenience country by Canada, and that British shipping concerns are forming companies in Bermuda so as to avoid the present high taxation in this country shows how dangerous it would be to generalise. Incidentally, the publication of the report has anticipated the survey which was undertaken by the International Chamber of Shipping, and the publication of which has been held up for several reasons, including the Suez Canal crisis.

Similarly, with regard to flag discrimination, the committee reiterates its condemnation of all forms of interference with the efficiency of shipping services and states that it advises the council, in all appropriate cases, of action which might suitably be taken by the O.E.E.C. governments to combat these practices. Rather ruefully it observes that it has many frustrations—that it is always easier to evaluate failure than success—but nevertheless firmly believes that both in positive achievement and in preventing the further spread of discriminatory practices it is performing an essential task.

Those concerned with the problem of delay in the turn-round of shipping in ports will look forward with interest to the supplementary report which the committee is preparing, in which " any necessary recommendations will be made as to further action which could usefully be taken by the O.E.E.C." The report repeats the argument which is familiar to all—that slow turn-round is due to two main factors—inefficient port facilities and labour difficulties. It is rather platitudinous, perhaps, to say that port building and modernisation programmes must provide facilities adequate for the changing pattern of trade, ship design and mechanical development; and that continual efforts must be made to solve labour problems as they arise. But the committee recognises that there are so many imponderables to consider that it is difficult to forecast the future. It is claimed, however, that since 1951, when the council of the O.E.E.C., on the submission of the committee, recommended member governments to take all possible steps to improve the turn-round of shipping in the ports within their territories, steps have been taken in many countries by governments to alleviate the position. Ports have been modernised, efforts made to organise and educate labour to a higher state of efficiency, and communications to and from ports have been improved. Unfortunately, it is added, in other countries the situation over the past few years has shown no improvement, and in some cases has deteriorated.

Ocean Transport of Natural Gas.

A paper was recently presented at the annual general meeting of the Institution of Gas Engineers by Messrs. J. Burns and L. J. Clark, chief engineer and development engineer respectively of the North Thames Gas Board, in which the economics of transporting bulk supplies of natural gas from foreign sources was discussed.

Natural gas is one of the world's major sources of energy, but it is not readily transportable and therefore much of it is flared to waste. It has therefore been suggested that such waste gas could be liquefied under atmospheric pressure and transported by sea in special ships containing insulated tanks. When gas is liquefied by deep-freezing down to about 260 deg. Fahr., it can be concentrated to one six-hundreth of its original volume, making it possible for large quantities to be carried by ships in a relatively small space, provided that the storage on board is well insulated, so as to keep the gas in liquid in deep freeze. On arrival, the gas would be discharged as liquid into insulated land storage tanks and subsequently regasified to augment the public supply system.

This plan was first publicised in America about two years ago in connection with a project for transporting natural gas in insulated tanks in barges, from its source in the Gulf Coast area, up the Mississippi to Chicago. Although this scheme is not yet in operation the construction of the liquefication plant and the first transport barge is nearly completed and operating trials are in hand.

Investigations are now being carried out in Europe into the possibilities of adapting the idea to the ocean transportation of natural gas. The Middle East, Venezuela and Mexico are considered to be most suitable geographically for supplying liquid gas to Great Britain and large reserves of gas are available in these countries as there is only a limited local demand. There is also the added advantage these gas reserves are located relatively near to the sea ports thus facilitating overseas shipment.

Although there is sufficient precedent and technical knowledge in the processes of liquefication and storage to establish confidence in their successful application to natural gas, there is no precedent so far in the case of ocean transport, and no ships have yet been built with insulated tanks for carrying fluids at sub-zero temperatures. In ships where heavier types of liquid gas has been transported, it has been carried at atmospheric temperature in batteries of vertical pressure cylinders which are mounted within the existing hold spaces. It is estimated that the capital costs of refrigerated gas tankers would be about twice those of conventional oil

Editorial Comments—continued

carriers, as there are many special points of design to be considered, and it is therefore considered that in order to be competitive with other systems of fuel transportation ships of this type would have to be in the 25,000 to 35,000 ton class. Many alternative designs have been suggested for these carriers and it appears desirable to build or partially convert a small prototype vessel for the initial trials with liquid methane, to determine the ship's actual behaviour at sea.

The idea is novel and would undoubtedly prove very costly and it is evident that to be economical the cost of gas at the source would have to be low. The authors of the paper conclude by noting that the cost of importing 110 million cu. ft. of natural gas, per day, from Venezuela to London, would involve a capital expenditure of about £40 million for the whole project. This, it is stated, compares quite reasonably with the capital investment necessary for a gas-production plant of conventional design.

Limpets and Seaweed Growth.

Harbour engineers are often concerned about the growths of seaweed, barnacles and limpets upon rocks, and the influence they may have upon tidal flow and structural work. It has generally been assumed that the force of the waves has been the sole factor influencing the greater growth of limpets or barnacles on exposed headlands and the greater growth of seaweeds in sheltered bays.

Writing in the 68th annual report of the Marine Biological Station which Liverpool University maintains at Port Erin in the Isle of Man, Dr. A. J. Southward describes a study of the balance between the populations of limpets and seaweeds on wave-beaten rocky shores in which he shows that the habits of the limpet feeding voraciously on the marine algae and seaweeds is an important factor in the control of marine plant growth. When limpets were removed from lime-stone ledges at low water at Port St. Mary, the rocks were colonised by growths of marine plants and within two years a dense clothing of seaweed replaced the limpets. When the experiment was repeated on more exposed, wave-beaten surfaces at Port Erin where it is unusual to find even traces of these brown seaweeds, there was a similar, if less intensive, plant growth. Eventually more limpets came to feed upon the seaweeds until they had reduced them. Limpets living on exposed, wave-beaten rocks were shown to grow their shells slower and they were thicker and more prominently ribbed than the thinner shells of limpets living amongst the more abundant food and shelter of seaweed beds, where the shells grew quickly and were less prominently ribbed.

The sequence of changes that follow the removal of limpets, by storm or other means, from barnacle-covered and wave-beaten rocks follows a cycle of as much as five years in which a diatom film is followed by green algae, then brown seaweeds develop, whereupon the rock is repopulated with limpets feeding on them until the limpets have reduced the seaweeds, when the limpet population declines and more room is available for the settling of barnacles, which may in turn be smothered by the growth of seaweeds, and so the cycle continues. The strong appetite of the limpet is thus as important as the force of waves in influencing the growth of seaweeds, and this ubiquitous shellfish of rocky coasts is also an influence upon barnacle numbers.

Oil Pollution of the Sea.

As already announced in our August issue, the Oil in Navigable Waters Act, 1955, came into force on the 8th of this month, since when it is an offence for British ships to discharge persistent waste oils into the sea anywhere within 1,000 miles of our Atlantic coastline. Speaking in London recently, however, Mr. James Callaghan, M.P., chairman of the Co-ordinating Advisory Committee on Oil Pollution of the Sea, stated that he expected to see very little improvement in the state of our beaches. Although most British shipowners had not waited for the new regulations, and had stopped oil discharge overboard some time ago, the British Government had no jurisdiction to prevent oily sludge being discharged from foreign ships. In international law, he pointed out, they could come right up to the three-mile limit discharging oil.

It will be recalled that in an endeavour to persuade all shipowners to adopt higher standards, the British Government, in 1954, called an international conference of forty nations, who agreed that the menace of dumping oil overboard should be controlled by law. So far, however, only five countries, Great Britain, Denmark, the German Federal Republic, Mexico and Sweden have passed the necessary legislation.

It is to be hoped that all nations will come into line in the near future, especially the United States of America, Panama and Liberia who, between them, control a tanker tonnage totalling more than fourteen million n.r.t. Liberia has agreed in principle, but Panama and the United States have yet to do so.

The Co-ordinating Advisory Committee on Oil Pollution believes that within the next few years pollution of the sea will become steadily worse, as more and more tankers are being built for use in Western Europe. Following the progress which has been achieved in Great Britain, the Committee intends to intensify its activities in overseas countries. We wholeheartedly agree with Mr. Callaghan's contention that "if British shipowners can do it, so can others" and wish the Committee success in their intention "to go on agitating until it is illegal for any ship of any country to dump oil anywhere throughout the Seven Seas."

Topical Notes

60th Anniversary of New Orleans Commissioners.

Last July, the Port of New Orleans celebrated the 60th anniversary of the establishment of a Board of Commissioners. This Board, which now has almost exclusive jurisdiction over a 20-mile waterfront, is a state agency and, since its creation in 1896, has built some 39 large wharves and many ancillary facilities including the Public Grain Elevator, which exports over 90 million bushels of grain each year. It also was responsible for establishing a Foreign Trade Zone and constructing the 5½-mile Industrial Canal which connects the Mississippi and Lake Pontchartrain. At present, the Board is engaged on a further expansion programme, which is estimated to cost $72 million.

Annual Report of Bootle Fire Brigade.

In the Annual Report of Mr. R. K. Barlow, chief fire officer to the Fire Brigade Committee of Bootle Corporation it was stated that co-operation with the Mersey Docks and Harbour Board would appear to be producing tangible results as the number of ship fires within that area of the Dock Estate protected by the Bootle Brigade is recorded as 11 for the year April 1955 to March 1956 as against 15 and 25 respectively for the two preceding years.

During 1955 only one ship fire could be regarded to be of a serious nature. This occurred in September in the steamer "Kohistan" and throughout the fire-fighting operations, a careful check was kept on the stability of the ship and the assistance and advice of the experts of the Mersey Docks and Harbour Board, who attended with the fire/salvage vessel "Vigilant," proved invaluable. The owners of the "Kohistan" later expressed their appreciation of the prompt assistance given by the brigade.

The Mersey Docks and Harbour Board have, in the last twelve months, secured the confirmation of new fires and lights byelaws and regulations. In view of the high fire risk on the docks and in shipping, however, it is most regrettable that the Board could not see their way to agreeing that qualified fire officers of the Merseyside Fire Brigades should have the right, under the bylaws and regulations, to carry out inspections of ships in the port.

The Report states that the scope of fire prevention is spreading, mainly due to the excellent liaison which has been built up between the Brigade and local industry and commerce over the post-war years. Shipowners and repair contractors, during their preliminary discussions on overhaul of ships in graving dock, now request advice and, therefore, adequate fire prevention measures concerning this type of risk receive full consideration from the start, resulting in necessary co-ordination between ship and shore and effective precautionary measures being observed.

To assist in improving the effectiveness of patrolling and security measures on ships in port, a series of two-day training courses for ships' security patrols, supported by the shipping companies using the port, and with a syllabus approved by the Liverpool Steamship Owners' Association, have been held at the Central Fire Station.

The Port of Blyth, Northumberland

An Historic North-East Coast Port

By G. L. ATKINSON, M.Inst.T.
(General Manager and Secretary, Blyth Harbour Commission).

BLYTH Harbour on the coast of Northumberland, some 16 miles north-east of Newcastle, derives its importance primarily from its shipments of coal, of which over five million tons annually are despatched to coastwise and overseas destinations, but it has also an inward trade in cement, pit props, sawn timber and tiles, amounting to some 70,000 tons a year.

The port is administered by the Blyth Harbour Commission, a public trust, established by Act of Parliament in 1882.

The main facilities of the harbour lie on either side of the estuary of the River Blyth, on the banks of which are coal-shipping berths, together with auxiliary waiting jetties and also substantial shipbuilding and shipbreaking yards. In addition, there is a tidal dock of some 25 acres providing further waiting berths and quays for the handling of general traffic and for a small inshore fishing industry which is based on the port.

Historical Background.

The history of Blyth Harbour can be traced back to the twelfth century. Records show there was a trade in salt, which was obtained by using local coal to evaporate sea-water and was sent by sea to various places. In the fifteenth century salt was being shipped to London, Hull and Yarmouth, but later this trade declined and disappeared.

The dominant influence in the development of the harbour has been the commercial exploitation of the East Northumberland coalfield. The successful rise of the port to its present position as the main outlet for the coal produced in this area is largely a story of successive efforts to provide a harbour with adequate coal shipping facilities and depths of water commensurate with the increasing size of ships. These depths had to be achieved despite the fact that much of the bed of the River Blyth consists of solid rock.

The first record of coal exports in any quantity was in 1609, during which year 21,571 tons were shipped. The shallowness of water at this time and, in fact, till 1869, made it impossible for vessels to complete loading in the river, and it was necessary for a ship after taking part of its cargo within the harbour to move and anchor off the river mouth and there receive the balance of its requirements from small craft known as "keels."

Development of the port was given considerable impetus by the purchase in 1723 by Matthew White of Newcastle and his son-in-law, Richard Ridley, of Blagdon, near Blyth, of an estate bordering on the river. This estate had been forfeited to the Crown because of the participation of the previous owner in the Jacobite rebellion of 1715. The Ridley family had wide business interests in the neighbourhood, including the Plessey collieries, which at this time provided the bulk of the coal shipped at Blyth. The link thus established has continued until this day, for both Lord Ridley and his son, the Hon. Matthew White Ridley, are members of the present Commission.

By 1730 a coal quay, a ballast quay and a pilots' watch house had been built and a lighthouse erected. In 1765 the North Dyke, the first breakwater, which took the form of a long wall of loose stones laid on the rocks on the east side of the harbour, was constructed. This was followed in 1788 by the building of the first staith. This staith, which consisted of an elevated line of rails ending at the water's edge, represented a great improvement on the previous method of loading coal by barrows, because it enabled horse-drawn wagons from the Plessey collieries to tip their contents direct into the ship's hold. In the same year the High Lighthouse was built. It is still in use to-day as one of the leading lights for the guidance of ships navigating in the harbour approaches and entrance channel.

At the end of the eighteenth and nineteenth centuries a number of new collieries were sunk on both sides of the river Blyth, and in 1847 the Tyne and Blyth Junction Railway was formed. This Company took over the existing colliery railway to the port and in 1849 constructed new staiths with seven berths each provided with a coaling spout.

Port Authority Established.

Up to this time there was no single authority able to develop the river estuary. The influence exercised by the successive heads of the Ridley family was as Lords of the Manor, but other landowners had riparian rights. It became evident that for the growing needs of trade a unified port authority was needed, and accordingly a Bill was promoted to form a public company with a capital of £150,000, and by an Act of 1854 the Blyth Harbour and Dock Company came into existence with powers "to improve the harbour of Blyth and for constructing Docks there." Sir Matthew White Ridley was its first Chairman and ambitious plans were drawn up for the expansion of the port, by building a new breakwater and deepening the channel, by means of which it was

Aerial View of the Port of Blyth.

The Port of Blyth, Northumberland—continued

The West Staiths, administered by British Railways.

estimated that the shipments of coal would reach 750,000 tons annually, which was three times the total for 1855. This figure was not realised. The maximum achieved by the Company was 343,014 tons in 1873. After that year shipments declined, largely due to the advent of iron ships needing a greater depth of water than the port provided. In 1881 coal shipments were only 180,944 tons, although two new staiths had been built on the south side by the North Eastern Railway Co., which had absorbed the Blyth & Tyne Railway.

The Harbour & Dock Company were unable to command the necessary support to raise sufficient funds to deepen and modernise the harbour, and on February 4th, 1882, they passed a resolution that a public trust should be formed. Evidently no time was lost, for the Bill was drafted, presented to Parliament and received the Royal Assent on 19th June, 1882. Thereupon control of the harbour passed into the hands of a Commission consisting of 13 members, six of whom were elected by shipowners and traders, and the remaining seven appointed to represent various local interests.

Development and Improvement Works.

The first engineer appointed by the new Commissioners was Mr. J. Watt Sandeman of Newcastle, and a vigorous development programme was put in hand, aimed primarily at widening and deepening the entrance channel. The following year a start was made on a new entrance channel slightly to the west of the existing one, an alteration which made the deepening quicker and cheaper, as on the new alignment much less rock was encountered. In 1885 a new west breakwater 2,470-ft. in length was completed, and in 1886 the East Pier was extended by 300-ft. Two new berths (now known as 1 and 2 and 3 and 4 Berths) were constructed in conjunction with the North Eastern Railway and came into use in 1894. Two years later, again in conjunction with the Railway Company, the four berths comprising the present North Staiths were opened for traffic. These berths had a depth alongside of 24-ft. at low water but were in later years dredged to 27-ft.

By 1898 the entrance channel had been deepened to 16-ft. at low water and widened to 300-ft., and this, together with the improvements to the east and west breakwaters and the establishment of the new staiths already mentioned led rapidly to increases in coal shipment. These first exceeded 1,000,000 tons in 1887, and by 1898 had increased to over 3,000,000 tons.

A tidal dock near the harbour entrance was completed by 1899 and remedied the need for additional berths for vessels awaiting their turn at the coal staiths, and was later developed to provide accommodation for import cargoes by the addition of quays, sheds, roads and railways. It is now known as the South Harbour.

A further extension of 900-ft. out to sea was made to the East Pier by 1899 and a new lighthouse of 60,000 candle power constructed at its seaward end.

Steady progress was made in the work of deepening the harbour, and the problem presented by the rocky formation of the river bed was met by using two Lobnitz rock-breaking craft and two rock dredgers. By 1912 the harbour had been deepened throughout to 20-ft. at low water and 35-ft. at high water.

Owing to the continued expansion of coal production on the northern side of the river, further improvements were planned comprising the dredging of a new area of deep water in the upper harbour and the construction jointly with the North Eastern Railway of new staiths.

The necessary powers were obtained by an Act of 1912, which also altered and enlarged the Commission to its present constitution of 19 members.

Delay in the provision of the new facilities was caused by the 1914-1918 war, but the new staiths (now known as the West Staiths), 1,600-ft. in length with 30-ft. of water at low water, were eventually opened for traffic in 1928.

In 1922 a new West Pier 1,450-ft. long was completed. It was built some 350-ft. west of the old pier, the seaward end of which was replaced by a training wall to preserve the channel. The area between the old pier and the new one formed a wave-spending basin. The inner end of the old pier was replaced by a reinforced concrete structure. It was set back 50-ft. to widen the channel and form the eastern side of the South Harbour.

The deepening of the entrance channel to 24-ft. at low water was completed by 1924.

With the creation of deep water in the upper harbour the Cowpen Coal Company (who already had two berths on the north side) decided to provide a coaling berth to serve their Bates Colliery, which is close to the south side of the river. The berth was dredged to 27-ft. at low water and the coaling jetty is equipped with two belt conveyors, each of which can traverse an arc of 130-ft. At this berth, which was brought into use in 1934, the coal is teemed at ground level and lifted by the conveyor belts over the ship's side. All the earlier coaling facilities in the port are in the form of staiths, where the rail wagons run on to an elevated railway high above the ship.

This brief account of this history of the port summarises the steps by which the original estuary of the River Blyth was converted into the present port, with modern equipment and adequate depths of water for the needs of its trade.

To-day the harbour entrance is protected on the east by the East Pier, now 4,580-ft. in length, and on the west by the West Pier, 1,480-ft. long. Including the entrance channel between these piers the deep water area of the harbour is 140 acres, and for most vessels using the port entry and departure is practicable at all states of the tide. The width of the entrance channel is 300-ft. between the piers and 270-ft. at its narrowest part. The dredged depth in the entrance and main channel of the harbour is 24-ft. at mean low water spring tides, although to allow for siltage the published tidal predictions are based on 22-ft. The tidal range varies between 14-ft. at ordinary spring tides and 9-ft. at neap tides.

During the year 1955 3,752 ships with a total net register of 2,330,862 tons entered the port.

Coal Trade

To cater for the shipment of coal, which last year totalled 5,287,121 tons, there are now thirteen berths. At ten of them the upper structures of the staiths and the appliances are owned and operated by British Railways, and at these berths coal can be shipped from any colliery to which the railway has access. The Harbour Commission provided and is responsible for the lower structures. At the remaining three berths the National Coal Board own and operate the appliances. At the two berths at the

Cowpen South, administered by the National Coal Board.

The Port of Blyth, Northumberland—continued

north side the Harbour Commission is similarly responsible for the lower structure of the staiths, but the National Coal Board itself maintains the quay at Bates Wharf. Whilst the majority of the coaling berths are equipped with spouts, at a number there are belt conveyors, as shown in the accompanying table.

BRITISH RAILWAYS

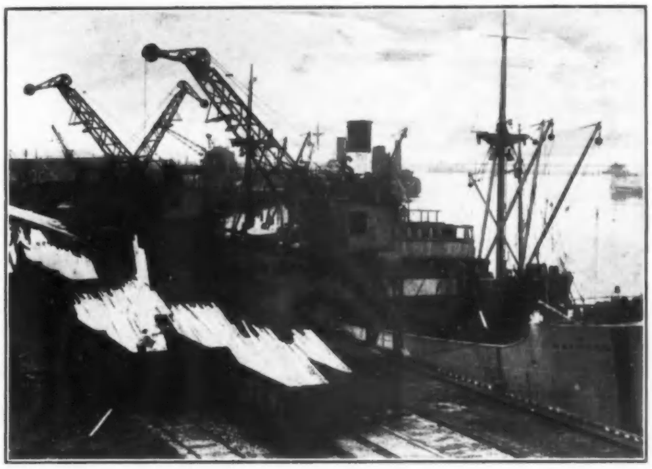
	Length of Berth	Depth at M.L.W.S.	Equipment	Teeming Heights above M.L.W.S.
SOUTH STAITHS (4 berths)				
Nos. 1 and 2 Berth	330-ft.	21-ft. to 25-ft.	2 Gravity Spouts	28-ft.
Nos. 3 and 4 Berth	500-ft.	25-ft.	2 Gravity Spouts and 1 Anti-Coalbreaker.	31-ft.
Nos. 5 and 6 Berth	470-ft.	30-ft.	2 Gravity Spouts	30-ft. 6-in.
Nos. 7 and 8 Berth	480-ft.	30-ft.	1 Gravity Spout and 1 Belt Conveyor	27-ft. 52-ft.
NORTH STAITHS (4 berths)				
Nos. 9 and 10 Berth	555-ft.	27-ft.	2 Gravity Spouts	37-ft. 6-in. and 36-ft. 8-in.
Nos. 11 and 12 Berth	405-ft.	27-ft.	2 Gravity Spouts 1 Anti-Coalbreaker.	35-ft. and 33-ft.
Nos. 13 and 14 Berth	510-ft.	27-ft.	2 Gravity Spouts and 1 Anti-Coalbreaker	37-ft. 6-in. and 36-ft. 8-in.
Nos. 15 and 16 Berth	360-ft.	27-ft.	2 Gravity Spouts and 1 Anti-Coalbreaker	35-ft. and 33-ft. 3-in.
WEST STAITHS (2 berths)				
Nos. 17 and 18 Berth	500-ft.	30-ft.	1 Gravity Spout 2 Conveyors: High Low 1 Anti-Coalbreaker (Electric).	32-ft. 59-ft. 6-in. 49-ft. 3-in.
Nos. 19 and 20 Berth	500-ft.	30-ft.	1 Gravity Spout 2 Conveyors: High Low	27-ft. 52-ft. 6-in. 44-ft. 9-in.

NATIONAL COAL BOARD

	Length of Berth	Depth at M.L.W.S.	Equipment	Teeming Heights above M.L.W.S.
Cowpen South (1 berth) (Bates) Wharf.	600-ft.	27-ft.	2 Conveyors and 2 Anti-Coalbreakers (Electric).	67-ft.
Cowpen North (2 berths)				
Double Berth Jubilee Berth	810-ft.	25-ft.	2 Gravity Spouts 1 Conveyor	42-ft. 46-ft. 6-in.

During the years 1934-1937 over 6,000,000 tons of coal were shipped annually, the record year being in 1936 when 6,788,266 tons were shipped. An inevitable decline took place during the war years of 1939-45, but post-war recovery was rapid as is shown by the following figures:—

The South Harbour, Blyth.



Discharging sawn timber at South Harbour.

Year	Tons	Year	Tons
1946	4,159,530	1951	6,335,688
1947	4,775,636	1952	5,680,567
1948	5,592,510	1953	5,863,175
1949	5,776,238	1954	5,382,889
1950	6,197,998	1955	5,287,121

General Trade

The General cargo trade of the port averages about 70,000 tons per annum. It consists almost exclusively of imports. The principle commodities are cement and roofing tiles for building, pit props for local collieries and sawn timber. Timber yards, about 18 acres in extent and well equipped with railway sidings, cater for the storage of sawn timber and pit props.

GENERAL TRADE FIGURES—Years 1954 and 1955

Traffic.	1954 Tons	1954 Tons	1955 Tons	1955 Tons
Inward:				
Cement	52,020		51,334	
Pit Props	10,626		10,327	
Deals, Battens, Boards	1,123		2,155	
Sleepers	611		1,057	
Tiles	3,723		3,160	
Oil Fuel	2,969		3,788	
Miscellaneous ...	1		878	
		71,073		72,699
Outward:				
Fuel Oil	3,448		4,172	
Miscellaneous ...	92		65	
		3,540		4,237
Total		74,613		76,936
Value of Fish landed.		£11,017		£14,200

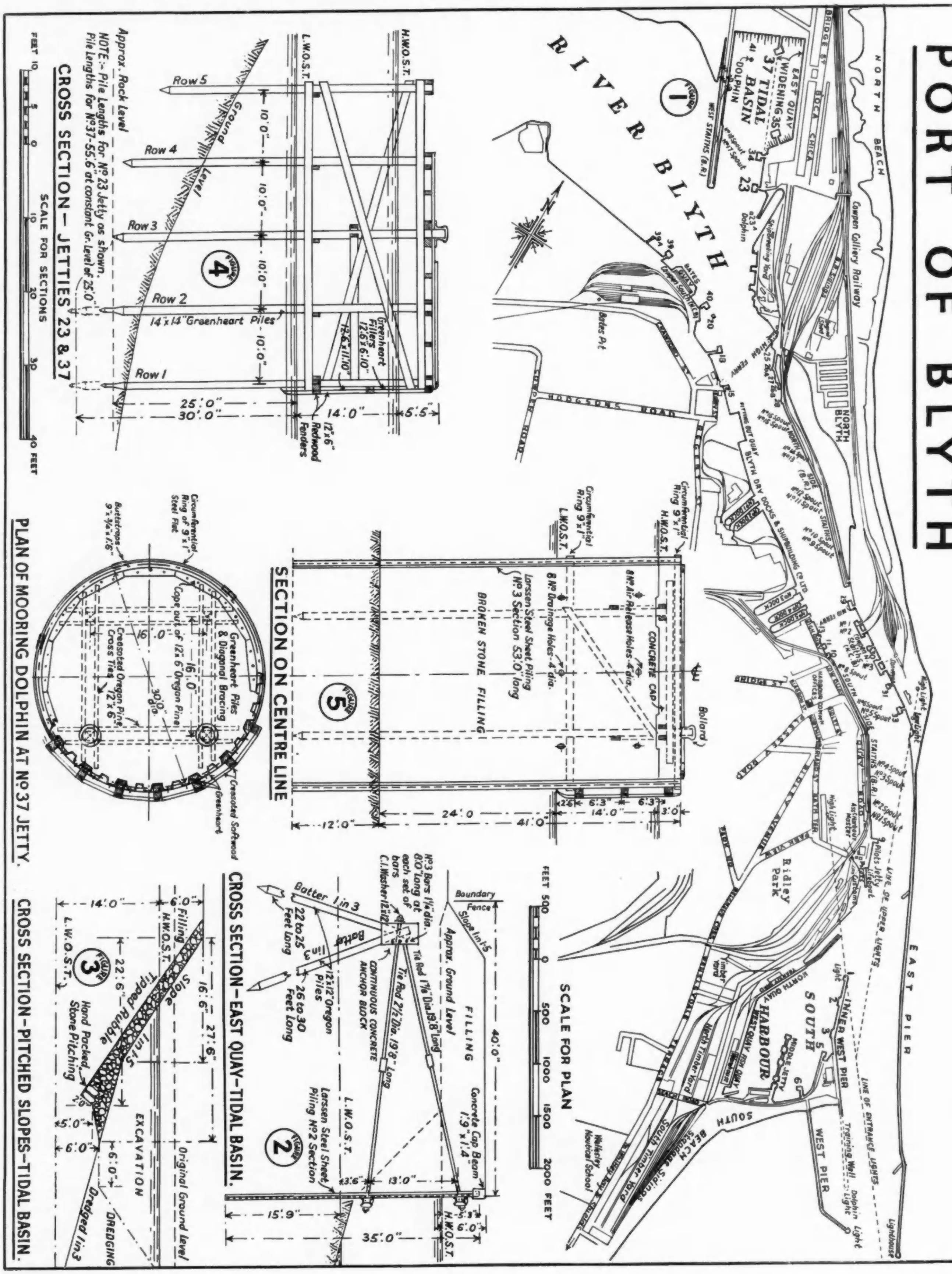
As already mentioned, two quays in the South Harbour each 500-ft. long are equipped with electric cranes to deal with this kind of traffic. There is road and rail access to both quays and sheds for storage adjoin them.

GENERAL CARGO BERTHS
(South Harbour)

	Length	Depth at M.L.W.S.	Height above M.L.W.S.	No. of Berths
NORTH QUAY. (Nos. 2 and 3 Berths) 2 Electric $2\frac{1}{2}$-ton and 1 Electric 3-ton Travelling Crane 1 Steam 12-ton Fixed Crane.	500-ft.	21-ft.	5-ft.	2
WEST QUAY. (Nos, 4 and 5 Berths) 3 Electric 3-ton Travelling Cranes.	500-ft.	19-ft.	5-ft.	2

In addition to cranes mentioned above, there are also available three steam travelling cranes of $2\frac{1}{2}$ tons, 3 tons and 5 tons capacity

The Port of Blyth, Northumberland—*continued*



The Port of Blyth, Northumberland—*continued*

respectively. These cranes are not suitable for direct working between ships and quay but are used for general traffic purposes.

WAREHOUSES (all single storey)

Warehouse	Situation	Dimensions
No. 1	Adjoining southern end of West Quay.	200-ft. x 90-ft.
No. 1 Extension.	West Quay.	120-ft. x 47-ft.
No. 2	At North Quay.	140-ft. x 45-ft.
No. 3	At South Quay. (Not Useable by Shipping).	200-ft. x 50-ft.

Above quays and warehouses have direct road and rail access.

Shipbuilding and Shiprepairing.

Shipbuilding has been an important industry in the port since it was established about the middle of the eighteenth century. The firm which now represents this industry is the Blyth Dry Docks & Shipbuilding Co. Ltd., whose premises on the south bank cover nearly 28 acres and include five graving docks and four building berths. Modernisation and improvements have been carried out during and since the war.

The building berths are suitable for the construction of ships as under:—

No. 1 Berth:	300-ft. B.P. x 50-ft.	One 5-ton electric travelling crane.
No. 2 Berth:	370-ft. B.P. x 54-ft.	
No. 3 Berth:	550-ft. B.P. x 70-ft.	Three 15-ton electric travelling cranes.
No. 4 Berth:	450-ft. B.P. x 65-ft.	

A deep water fitting-out berth is situated at the western end of their river frontage and is equipped with a 25-ton electric travelling crane.

Dry-docking facilities are provided by five graving docks as under:—

	Length of ship (B.P.)	Breadth of ship.	Depth of water on sill. M.H.W.S.	Crane power available.
No. 1 Dock.	376-ft.	50-ft. 0-in.	20-ft. 6-in.	10-ton electric travelling.
No. 2 Dock.	310-ft.	49-ft. 9-in.	20-ft. 6-in.	
No. 3 Dock.	460-ft.	58-ft. 6-in.	22-ft. 6-in.	25-ton electric travelling.
No. 4 Dock.	334-ft.	44-ft. 0-in.	17-ft. 6-in.	10-ton electric travelling.
No. 5 Dock.	307-ft.	45-ft. 6-in.	19-ft. 0-in.	

The yard is fully equipped to carry out hull repairs and complete engine overhauls for all types of vessel, from small motor launches to steam and diesel driven ships of 10,000 tons deadweight.

Shipbreaking.

On the north bank of the river in the Upper Harbour are situated the premises of the Hughes Bolckow Shipbreaking Co. Ltd., which occupy an area of some 14 acres.

The breaking-up process is commenced at the adjoining deep-water berth, some 600-ft. in length, and concluded in a shallow tidal dock. Many famous ships have ended their days at this yard.

The Future

Electricity Generating Station.

The principal development, at present taking place, is in connection with the building of a large electricity generating station by the Central Electricity Authority adjacent to the harbour. Intakes for cooling water and a tidal dock for ash-disposal barges are to be built at the north end of the Tidal Basin adjoining the West Staiths.

The first part of the station will have a capacity of 480,000 kilowatts and is scheduled to begin the generation of electricity in 1958. The construction of the second part of the station, with a further capacity of 600,000 kilowatts is planned to follow.

The site for this development was selected because of its central position in the Northumberland coalfield and the adequate supplies of water for cooling purposes. It will require large quantities of coal, which would otherwise be shipped through the harbour, the trade of which will thus be adversely affected. The development of two large open-cast mining sites will, however, augment shipments at the port for several years to come, and large-scale schemes for the modernisation of certain collieries in Northumberland will also, it is expected, result in increased production to an extent which will substantially make up for the diversion of coal to the power station.

Engineering Developments

The following notes on engineering matters have been supplied by Mr. G. D. Ross, M.Inst.C.E., who was Engineer to the Harbour Commission for 26 years until his retirement in 1955.

Since the development of the Upper Harbour no works of a major character have been carried out, but in accordance with the general policy pursued by the Commission of maintaining the port facilities on an efficient basis improvements have been made of which the most noteworthy was the widening of the Tidal Basin provided at the West Staiths. As originally constructed this basin was a rectangular water area of relatively narrow width, with three waiting berths, and from time to time congestion arose at them.

The eastern boundary of this basin was a pitched slope which was never stable, and the slips which continually occurred caused a good deal of anxiety for the safety of the timber jetties in front of the slope. Accordingly, it was decided to enlarge the basin to the limit of the space available to achieve a wider waterway with increased accommodation for waiting vessels and secure a stable eastern boundary. A wall of steel sheet piling 1,033-ft. long was constructed 220-ft. behind the existing cope line of the Tidal Basin in a trench previously excavated to a depth of 2-ft. above low water level. The piles were each 35-ft. long of No. 2 Section Larssen Steel Sheet Piling with 0.3 per cent. copper content and were secured to a continuous concrete anchor block 37-ft. in rear by sets of tie rods at 10-ft. 6-in. apart. A certain amount of pumping work was required to keep the trench for the sheet piles free of water and it was found that the clay became very treacherous when wet, so much so that it was deemed advisable to provide trestles each consisting of two raking oregon pine piles 25 and 30-ft. long at each set of tie rods. The heads of these piles were incorporated in the concrete anchor block.

On completion of the wall the Commissioners' bucket ladder dredger "Cowpen" dredged out the area between the original and new boundaries of the basin, about 1,000-ft. x 220-ft. to a depth of 24-ft. below L.W.O.S.T. The quantity of material removed was 354,000 cub. yds., and the additional deep water area provided measures approximately 4 acres. The general arrangement of the new basin with details of the steel sheet piling for the East Quay and the pitched slopes for the Northern and Southern ends is shown on the accompanying plan (Figs. 1, 2 and 3).

Two timber jetties each 70-ft. x 40-ft. have been constructed, one at each end of the basin, and as the design of these jetties is typical of the later jetties constructed at various points throughout the harbour a short description might be of interest.

It may be asked why timber construction has been adopted instead of reinforced concrete work. Careful consideration has been given to all circumstances bearing on this issue; the jetties are small isolated structures and normally provide accommodation for colliers ranging from 800 to 1,750 N.R.T. Many of these vessels are berthed under their own steam without the help of tugs, and in consequence the jetties are often subjected to considerable racking stresses when a ship comes alongside. The resilience of the timber-work structure has undoubtedly minimised the effects of minor collisions on both the ship and the jetty.

By the adoption of raking piles and a heavy deck slab all in reinforced concrete, with some form of spring fendering, a considerable degree of resiliency can be obtained, but in the short length of 70-ft. it would be difficult to achieve the necessary resistance to the longitudinal stresses set up when an approaching vessel hits the structure a glancing blow. Piles raking in the longitudinal direction would complicate the structure unduly.

To resist the attack of the marine borer "Limnoria Lignorum" which is extremely active in Blyth Harbour, British Guiana Greenheart timber is used for all piles and bracings below half tide level, and creosoted pitch pine or Oregon pine for timber above this level. Greenheart is by no means immune from attack by Limnoria but the rate of deterioration is slow, and piles which

(Concluded on following page)

Port Health Practice

U.K. and French Services Compared*

By Dr. T. L. HOBDAY, M.B., Ch.B., M.R.C.S.
(Assistant Port Medical Officer, Port of Liverpool).

THIS paper is based upon a visit made by the author to Marseilles and North Africa last autumn under the CIBA Anglo-French Bursary Scheme. In the first place an account is given of the general organisation of Public Health in France, with particular reference to control at ports and frontiers: there follows a detailed account of Port Health Administration in Marseilles itself, with special reference to certain features of outstanding interest there; and finally the British system is compared with the French as illustrated by Marseilles, and a word of comment is made upon the comparison.

General Public Health Control.

Public health control at frontiers, both land and sea, is designed to apply measures, internationally agreed, to prevent spread of the quarantinable diseases. This control is based upon foreknowledge of relevant endemic and epidemic areas. The World Health Organisation broadcast fortnightly a bulletin composed of reports received from all over the world, through the agency of governments or health authorities of "infected" areas, giving details of all quarantinable diseases of interest to health authorities in countries likely to be affected. A further bulletin, issued weekly, brings this up to date and, in addition, a daily bulletin is broadcast from Geneva. Both the Marseilles and Algiers Port Health Authorities employ full-time wireless operators, and the current day's bulletin is on the desk of the Medical Officer of Health when he enters his office in the morning.

France as a whole is divided into "health areas," each of which consist of several "frontier-counties," or departments: each "health area" has one or more "health-control-centres," which are further classified into one of three types according to the international traffic which they handle: the four areas of North Africa are considered part of the Metropolitan Organisation: the more distant colonies of Martinique, Guadeloupe, Réunion and French Guinea are independent health areas. All are under the direct control of the Ministry of Health and there is no local municipal control over any aspect of public health in France.

The personnel of the frontier health control service consist of:

Firstly: a medical staff, composed of doctors holding civil service appointments in Public Health, doctors in charge of provincial health organisations and certain other specially employed doctors, many of whom are part-tme.

Secondly: a technical branch, supervised by officers of the "sanitary police" having quasi-military ranks of captains and lieutenants.

Thirdly: a "working" branch, which consists of Chief, principal and ordinary sanitary inspectors: sea inspection staff, engineers and members of the sanitary police who hold the State Diploma in nursing and social welfare. All of this third branch is uniformed. Representatives of all these branches are found, as a team under the control of the Regional Medical Officer, in each Health Control Centre. The Regional Medical Officer himself works under the direction of County or Departmental Medical Officer, who is directly responsible to the Ministry of Health. In each public area, the medical officer in charge of the most important centre acts as a regional consultant in infectious diseases, and ensures, in cooperation with the County medical officers, that the working of the public health services in the different counties is co-ordinated, as far as they overlap.

Control at Seaports.

Special modifications of this general scheme are made in relation to Health Control at seaports. The French coast from the North Sea to the Atlantic, is divided into four public health areas or "strips" ("circonscriptions") each having headquarters at the principal port in the area: these headquarters are situated at Dunkirk, Le Havre, Nantes and Bordeaux. The division of coastline is made so that each port is roughly in the centre of the coastline over which it exercises administrative control. The whole Mediterranean littoral from Spain to Italy is considered as one, the fifth, "circonscription," and is administered from Marseilles.

Every port in each area, according to its significance, is equipped with a standing organisation which ensures health control, and which may grant or refuse pratique to vessels approaching the French coast either at the conclusion of, or at any time during, their voyage.

As is also the case in the United Kingdom, health control falls upon vessels immediately they arrive, though of course the measures to be applied to a particular vessel are determined by the health conditions aboard the vessel and by the medical history of the voyage. These details are revealed in the Maritime Declaration of Health signed by the Master and Surgeon (if any).

In the event of a serious outbreak of a quarantinable disease being reported from a ship en route to a French port, it would be diverted wherever possible to Le Havre, if approaching from the Atlantic, or to Marseilles if approaching from the Mediterranean: in each of these two major ports there have recently been constructed the most modern "stations sanitaires" in which every operation necessary can be undertaken for the detection and control of infectious disease, with full isolation hospital facilities adjacent.

The "Station Sanitaire."

The purpose of this very large and modern building in Marseilles, constructed in 1949, is to apply all measures of medical control to a large group, such as the complement of a big passenger liner.

* Paper presented at the Conference of Sea and Air Port Health Authorities held in Liverpool last June.

The Port of Blyth

(Continued from page 149)

have been in place here for nearly 60 years are still in serviceable condition. Every precaution is taken to select sound logs with as little sapwood as possible, and the results obtained amply justify the little extra work involved. Fig. 4 shows a typical cross section of bracing, fender work, etc.

A useful adaptation of the facilities of steel sheet piling is shown in Fig. 5 of a circular mooring dolphin which was constructed to replace a mooring buoy after trouble had been experienced in attempts to provide a suitable anchorage in the soft clay of the dock bottom. The dolphin is of circular shape 30-ft. in diameter and consists of No. 3 Section Larssen Steel Sheet piling 53-ft. long standing 41-ft. above dock bottom and penetrating 12-ft. into the clay below this level. The piles were pitched on a temporary circular guide frame and the junction effected before driving commenced. Driving was carried out in stages of about 4-ft. at a time, the first stage clockwise round the structure, then in the reverse direction, and again in the clockwise direction. The procedure completely overcame any tendency the piles may have to creep forward in the direction of driving. The body of the dolphin was then filled with broken stone filling and sealed with a concrete cap 3-ft. thick; two bollards, iron ladders and timber work fendering were provided to complete the structure. Approximate calculations indicate that the dolphin should withstand, without damage, the impact of a vessel of 5,000 tons displacement approaching at a speed of 45-ft. per minute. The dolphin has been subjected to several fairly severe blows when vessels have been warping from an adjacent mooring jetty to the loading berths at the West Staiths and neither the ship nor the dolphin has sustained any damage whatever.

Port Health Practice—*continued*

who have been contacts of a quarantinable disease, with the maximum speed and comfort and the minimum upset and danger. The building itself is in the port area, so that the suspects cannot enter the town until examined.

There are two large reception halls: the first can hold 500 people; the second, reserved for those corresponding to first class passengers, can hold 150. The whole of the station is air-conditioned, and has been designed to be completely ratproof. Those entering the reception hall are informed by loudspeaker of the proceeding to be undertaken; they are given a small numbered container for their valuables; the same number is attached to their hand baggage and, after they have undressed, to their clothes, which are then collected in a steel mesh container: a wrist bracelet is given to them bearing the corresponding number in order that possessions may be identified rapidly later.

Each person is then given a piece of soap and directed to one of the 40 separate showers. Warm towels are provided and a current of specially heated air quickens the drying process. In drying rooms, the medical officers visit and examine everyone separately: any vaccinations or inoculations necessary are performed at this point. Meanwhile the containers holding the clothes have been attached to an overhead rail which leads them through the disinfecting chamber and, later, through a heated drying chamber to the dressing rooms, where they are returned to the owners. Anybody requiring isolation is removed to the Hôpital de la Calade, and the others are permitted to proceed to their ship or other destination. By means of the loudspeaker system and a system of barriers, which impose the correct procedure upon all contacts, the station needs extremely few staff: it is normally in use as a Public Health maternity clinic.

Control at Airports.

Control at airports follows very much the pattern of control in the United Kingdom, and the usual International Declaration of Health is rendered to the Medical Officer or the Customs. Routine disinfectation is undertaken of all aircraft arriving from malaria areas. The three most important airfields in France, Orly and Le Bourget in Paris, and Marseilles, are officially nominated as "Aéroports Sanitaires" and are lavishly equipped for the diagnosis, isolation, and treatment of all major infectious conditions. Similar facilities are being constructed in the airport at Nice.

Marseilles.

It may be interesting to note the particular problems of Marseilles from the historical viewpoint. Traditionally the "Gateway of the East" and always the busiest commercial port in France, it is not surprising that organised Port Health control began, in France, first in Marseilles. A Port Health regime was instituted in the 15th century, and was preceded only in Europe by the quarantine measures enforced half a century earlier in Venice. Up to that time the appearance of a major epidemic following the docking of a merchant ship was traditionally regarded as Act of God, a sort of divine punishment, against which prayer alone was the remedy. Marseilles was heavily infected with plague in the years 503, 595, and 591 A.D.

In 1374 Venice, and in 1377 Ragusa, formally forbade entry to any vessels thought to be affected with plague or any other major infectious disease: they had to remain off the port for the traditional period of 40 days, and the term quarantine was, of course, founded on this attitude.

Plague again struck Marseilles in 1376 and a quarantine system was established and enforced in 1383. This simply established, legally, the 40 days purification period, based upon the measures taken at Italian ports, and was referred to in a municipal document dated 1472.

From 1477 Marseilles City Council decided to establish special hospitals for the crews and passengers of vessels suspected of importing plague, and the term lazaret was used for the first time. They were, of course, isolation hospitals: the first was built in 1521 and a much larger building was constructed in 1558. Nevertheless major epidemics continued, and in 1629 a "Bureau de Santé," or Public Health Department, was established in Marseilles and undertook the management of the two lazarets which were situated upon the islands of Pomegus and Ratonneau in the bay of Marseilles. Several other isolation hospitals were built at this time on the mainland in the vicinity of the port. The day to day management of these hospitals was undertaken by a "Conseil d'Intendance" or "Vigilance Committee," composed chiefly of retired mariners and elected every October by the City Council.

The actual formalities preceding the "clearing" of a vessel at this time were very interesting: The master of the vessel, which had of course to remain at anchor, appeared before the officials of the Service Sanitaire who sat in solemn council in a stone building at the entrance to the Port: his Bills of Health were inspected: they would be "nettes" (clean), "touchées" (suspected), or "brutes" (infected). The master, judiciously if not bacteriologically, separated by a fine wire grill from his questioners, was closely interrogated upon the circumstances of the voyage, and all his answers carefully recorded in massive volumes still preserved in the port archives. All the papers he presented were carefully fumigated, if one may use the term, with scents of various types. Meanwhile his passengers were confined to the lazaret if there was any suspicion of infection, or if the Bills of Health were either "touchées" or "brutes." The cargo itself was left in crates ashore, for perhaps months, before it was freed. During their period of quarantine on the island lazarets, the passengers received three "treatments" with perfumes thought to have purifying effects: the exact perfumes used are not known, but were either "doux" or "violent" according to the view taken by the medical officers of the hazards. They were treated first on arrival at the lazarets, then in the middle of the quarantine period, and finally before being allowed free entry into the town of Marseilles. Meanwhile, the doctors who were looking after the passengers kept well away from their patients and drank large quantities of pure vinegar. Nevertheless in spite of the protective effect of the vinegar, very many of the lazaret doctors in Marseilles died during their period of duty.

After a very severe epidemic of plague in 1720, a new organisation, taking the title of "Conservateurs de la Santé," was established, and the standing, in those days, of Marseilles in Port Health affairs, can be assessed by the degree which gave the medical authorities in Marseilles full control over all the lazarets around the coast of France, and not merely those of the Mediterranean area alone. The Conservateurs de la Santé continued to manage Port Health affairs in Marseilles up to 1850, when it was replaced by a centrally controlled service with direction from Paris. At this period a further lazaret was constructed in the Isle of Frioul, in Marseilles Bay, comprising five large houses, with 17-60 beds in each: and two very large barn-like buildings, each capable of accommodating 1,200 men: the latter were chiefly used for troops and immigrants. Baths and showers were provided on a lavish scale. In the latter half of the nineteenth century, of course, quarantine procedure became the subject of scientific and international regularisation, and the Marseillais appear justifiably proud of the comparatively effective measures they enforced before the enlightened view became the general one.

The vast amount of destruction suffered by the Port of Marseilles during the last war gave the Port Authorities the chance to plan and completely rebuild their Port Health installations, and these have been equipped lavishly, in particular the "Station Sanitaire," and the large laboratory, devoted exclusively to the examination of rats caught in the port and town of Marseilles, equalled only by the famous rat laboratory in Algiers.

Marseilles has been an active Mediterranean port since 600 B.C., and is generally recognised as the principal commercial French seaport. There are 456 scheduled liner arrivals and departures each month, quite apart from tramp and smaller coastal vessels: and about 600 scheduled air departures from the adjacent airport.

Present Port Health Procedure in Marseilles.

There is no direct municipal control of public health affairs in France. The Medical Officer of Health for the port of Marseilles, Dr. Lambrez, is in the direct employ of the French Ministry of Health, having the very senior rank of Inspecteur Divisionnaire de la Santé, and was seconded from the French navy for this appointment after the war. As Medical Officer of Health for the Port of Marseilles, he is responsible for all the Mediterranean coastline from Spain to Italy, and for Corsica in addition. In Marseilles alone he has no additional medical staff, though there is an un-

Port Health Practice—continued

official interchange system with other public health medical officers to cover holidays, sickness and free days. Under his personal direction are four "agents sanitaires" or sanitary inspectors, who maintain a 24 hour watch. No fixed list of infected areas is maintained and, surprisingly enough, no vessels are boarded in the approaches to the port: all are permitted to dock even though sickness is declared. The yellow flag is required to be flown by day and the red-over-white light at night, by all vessels from other than French ports, until pratique has been granted.

It is interesting, and perhaps profitable to note, that the pratique document issued to the master by the Health Authority, informs him of the address and telephone number of the Port Health office and warns him of his requirement to report to them any sickness occurring while in port.

Radio warning from approaching ships is not required, apart from those requesting radio pratique. The harbourmaster supplies the Port Health office with an accurate list of expected vessels each day, and the harbour lookout-post puts, so to speak, the fine adjustment on the timing. As the port is open and not in any way tidal, vessels can be expected at any time. When a vessel has docked, it is boarded by the agent sanitaire; until he has issued the pratique form to the master and permitted the yellow flag to be struck, no one may board. Exemption, as in the United Kingdom, is granted to pilots and customs officers. In the event of any sickness, the agent may himself, if he considers the case trifling, make arrangements for removal: otherwise the medical officer is called. Considerable reliance is put upon the abilities of the agent sanitaire.

Three fast motor launches about 30 tons each with four navigating staff are maintained by the Port Health Authority, but they are used as a means of transport within the dock area, as of course, there are no gates at any point in the system, and this method of conveying the agents sanitaires is by far the fastest.

Extensive use is made of radio pratique. The initiative for this privilege must come from the owners of the vessels concerned: they make their application directly to the medical officer, giving a list of the vessels concerned together with a photostat copy of the qualifications of the surgeon, and his photograph. All British ships carrying surgeons, notably the P. & O. passenger liners, are granted radio pratique, though the vessel has to make an individual request by the international signal MIBDU, each time it enters the port, and it cannot be presumed granted until the reply MIJMA is radioed back from the Port Health Office. Obviously this gives in some ways increased protection, as if any sickness is later detected by the agent sanitaire on his routine visit, radio pratique is withdrawn for that surgeon whatever vessel he may serve in, and this would lead to such repeated delays for the company that the surgeon would probably be dismissed. This ensures, perhaps, that the doctor in the ship is more careful in reviewing his medical state than he would be if pratique depended merely upon a brief discussion with the agent sanitaire. Since the system has been operated in Marseilles Dr. Lambrez has had no reason to regret its institution. Shipping companies are meticulous in notifying any changes of medical personnel in their ships to the Medical Officer of the Port.

The Port Medical Officer in Marseilles has certain additional duties to those we know in the U.K.: he is personally responsible for radio advice on medical matters to vessels requesting assistance, and he is also responsible for the venereal disease services for seamen. On the other hand he is not concerned with the quality of the imported food, which comes within the province of the Ministry of Agriculture, acting through the Veterinaire du Port, employing four inspectors (for meat products), and an official of the Contrôle Phyto-Sanitaire (for vegetables and fruit). There is a busy trade in live cattle, especially bulls and sheep from North Africa. Little else is imported through Marseilles.

Deratting.

The Medical Officer of Health is, of course, responsible for all measures against rats in ships. The agents sanitaires inspect the vessels at the expiry of the International Certificate: the only approved deratting agent is hydrogen cyanide fumigation, and "1080" is not approved. A novel approach to the problem is being tried at the moment, termed "Dératisation Permanente." Each French vessel is encouraged to appoint a deratting officer, usually a fairly senior navigating officer, from the crew: he is responsible for trapping and poisoning throughout the voyage. Very good results have been achieved and many ships which previously required regular fumigation are now receiving equally regular exemption certificates. The standard of investigation before granting an exemption certificate is very critical indeed in Marseilles and an exemption certificate granted there is certainly a very reliable document. Trapping of rats, both aboard vessels and on the quays, is the responsibility of the Chambre de Commerce which, confusingly enough, is a public body corresponding to British Port Authorities, such as the Mersey Docks and Harbour Board. All rats caught in the Port area and, for convenience, those caught in the town as well, are examined in a special laboratory by a Colonel of the Colonial Medical Service, which has its headquarters in Marseilles. The rats are anaesthetised—most are caught in the no-return type of cage—and the fleas collected in a tray below the anaesthetising chamber. The rats are then subjected to a post-mortem dissection for gross signs of disease: meanwhile the fleas are mounted on a very long microscope slide, fixed by Canada balsam, and passed seriatim under the microscope. The pathologist calls out the identification of each species to his assistant as he views them and a statistical table made of the various species of flea seen. The whole process of dealing with the day's catch in all respects takes perhaps an hour each morning: there is a special building devoted especially to this process, adjacent to the Port Health Office, employing a staff of four, including the pathologist.

In equipment and fittings this laboratory is surpassed only by the Laboratory in Algiers, controlled by Dr. Roger Meunier, the Port Medical Officer there. This is really both a laboratory for the examination of rats, and a most comprehensive museum of rodents of all types. It is also the bio-assay centre for red squill, which is grown in North Africa, and is subjected to very severe tests upon live rats before permission is granted to export a particular consignment. It does not appear, however, that Port Health control at Algiers is as strict as in Marseilles, for example, a ship docking at night is not visited on arrival: the Master or Chief Officer comes to the Port Health office at the first opportunity with the documents for the agent sanitaire: meanwhile the ship is not isolated in any way. In Algiers, as in Marseilles, all ships dock before inspection and the launches are used only for rapid transport within the dock system.

At this point should be mentioned the control exercised over ports other than Marseilles, but still within the area of the fifth circonscription. Between Spain and Italy there are several large commercial ports: Sete, Port Vendrez, Nice, and the new oil port of Port-de-Bouc. In these ports there are agents sanitaires, but the Medical Officers are appointed, part-time, from local general practitioners. All are responsible to the Medical Officer for Marseilles, who frequently visits them. At the small intervening ports, the Customs Officer is the Health Officer, with the power to grant or withhold pratique. However, the system of appointment is rather different from that in operation in the U.K. Usually the Medical Officer approaches the Senior Customs official of the area and, after discussion with him, appoints a suitable Customs officer as Health officer. It is a popular appointment as he is paid both by the Customs and the Ministry of Health: for health matters he is directly responsible to the Medical Officer at Marseilles. Incidentally, there is nothing directly corresponding to the Shipping Federation service in France: agents employ local practitioners under a "retainer" arrangement for visiting cases of general sickness, and it appears that these practitioners are far more careful to inform the Port Health authorities of all the circumstances, than are their confreres in Great Britain.

Marseilles is served by a very modern and busy airfield at Marignane, about 15 miles away. In 1953 over 450,000 passengers passed through the airport. Here a retired Colonial Medical Officer is appointed as Health Officer and resides in the airport premises. He is responsible not only for Port Health matters but for any accidents that may occur, and has most lavish facilities and equipment, including, on the airfield, two fully equipped wards, an operating theatre, and ample supplies of blood and plasma.

Port Health Practice—continued

Comparisons.

From what has been said it is clear that, with similar aims, the methods of enforcing Port Health control are very different in Marseilles, taken as a typical major French seaport, than in British ports. This statement should perhaps be clarified and some of the essential differences explained.

Firstly, Port Health is a government, not a municipal responsibility. This ensures uniformity of practice upon different ports, and means that policy is professionally directed: the French Minister of Health is almost always a doctor. Inspections from the Ministry in Paris are quite frequent, and any changes in practice or problems in other ports are fully discussed.

Secondly, whatever the final advantages in economy of personnel may be, there is no doubt that the British system of control, as far as detecting infectious disease is concerned, is more vigilant. Ships in France are not boarded before arrival, even when they may be suspected; they are, of course, met immediately on docking, but in those circumstances it can be very difficult to ensure that a vessel is adequately isolated, and furthermore the status of the medical officer is greatly reduced once the power to delay docking is taken away. The author believes that the system of boarding off the port is very much superior to the French method, though it may be more inconvenient.

Thirdly, far more use is made of the agents sanitaires, or sanitary inspectors, than is the case in Great Britain. It is very rare for the medical officer to board an incoming vessel himself. Again this may be more economical and convenient, but nevertheless there is always inevitable and even dangerous delay while the inspector communicates with the medical officer should a suspicious condition be found, and of course there is the hazard of a misdiagnosis. Furthermore the master of a ship is far more likely to give frank details of any medical events to the Boarding Medical Officer himself rather than to a relatively junior official.

Fourthly, there is no doubt that whatever the financial condition of France, there is great generosity and lavishness in providing equipment and facilities for medical, and in particular, Port Health purposes. For example, the Station Sanitaire in Marseilles, cost £100,000. The Port Health buildings themselves are well appointed and command an excellent view of the Port and its approaches. The Medical Officer has for the use of his staff three launches and a car for his personal use, and motor transport for the day-to-day use of his sanitary staff. The rat laboratory has already been mentioned: practically every publication of epidemiological interest is supplied; there is a special radio and operator to take down the daily health bulletins from Geneva. There were many other examples for the same attitude. No doubt this is due to the central and therefore remote control which governs the system: there are no local budgets to be balanced. Nevertheless, the actual vigilance is not superior to that practised in Great Britain, though the working conditions, climate apart, are certainly beyond anything a Port Medical Officer is likely to enjoy in the British Isles. In fact it was most disturbing in many ways to peep at this medical Elysium.

Marine Cargo Operations

Review of New American Publication

A book with the above-mentioned title has just been published in New York by John Wiley and Sons Inc. The author, Mr. Charles L. Sauerbier, has set himself a huge task, which he has certainly tackled with energy. In the preface he explains that the book was written to help the shipping industry fulfil its mission and that he has attempted to set forth and discuss as many of the tasks, concepts and facts affecting cargo operations as could be encompassed within a book of reasonable size. He adds that the information given is required not only in peacetime but in times of war, "for the need for an adequate reference text to guide and train a large influx of personnel in the event of a national emergency is obvious."

The book comprises nine chapters—(1) shipowners' organisation for cargo procurement, stowage, care and delivery; (2) cargo responsibility; (3) principles of stowage; (4) planning the stowage; (5) stowage of the cargo; (6) the ship's loading and discharging equipment; (7) materials handling principles and equipment; (8) ventilation of cargo holds; and (9) research and development in the industry. All are of interest to people in the shipping world.

The chapter on shipowners' organisation is, of course, based mainly on American procedure and the tables given cover the type of organisation existing at the present time in the main United States ports and perhaps particularly those on the east coast. It is of much interest that the author believes that ship's officers have a high degree of responsibility not only in transporting the cargo across the seas but in the way it is handled and stowed in the vessel. "All of the ship's officers must concern themselves with checking on the stowage of all items that go aboard the ship. They must know what is and what is not correct stowage, then they must insist that all stowage is done correctly." It would be of great benefit to the industry if this attitude again became general. In many shipping lines, however, there has, since the termination of the last war, been a tendency for ship's officers to believe that the extent of their job is to take their ship from port to port, leaving loading and discharging almost completely in the control of the shipping company's various agents.

The second chapter, "cargo responsibility," also has a U.S. flavour, the main acts quoted being "The Harter Act" of 1893 and "the Carriage of Goods by Sea Act" passed by Congress in 1936. The latter is fashioned somewhat parallel with the act with the same name passed by the British Parliament in 1924 and was another attempt (after the Harter Act) to standardise the ocean bill of lading and to clarify the relationship of the ship to its cargo. To enjoy the almost proverbial immunities given by the act, the shipowner must fulfil four responsibilities. He must exercise due diligence (1) to make the ship seaworthy; (2) to man, provision and equip her properly; (3) to exercise care in handling and stowing the cargo and (4) to make stowages fit for cargo. Details of a number of interesting American maritime law cases are given.

The three chapters on stowage occupy together over 200 pages and certainly must go a long way to fulfil the author's purpose of guiding and training personnel new to the industry. There is here also much information to which experienced officers will wish to refer from time to time, covering such matters as the stability and trim of the vessel, longitudinal stresses, hull deflection, the protection and segregation of cargo, the use of dunnage and temporary ventilators, broken stowage, lashing and, of course, stowage factors. Also described are satisfactory methods of handling and stowing various types of cargo, including, besides the conventional bags, bales, cartons, cases, etc. the more difficult items such as uncased motor vehicles, large and heavy containers and bulk cargoes. In addition, there are sections on special cargoes and specialised carriers. This portion of the book, which aims at encouraging rapid and systematic loading and discharge, is indeed so comprehensive that no more than an idea of what it contains can be given in a review of this length.

In Chapter 6 — loading and discharging equipment — various methods of rigging ship's gear are fully described. The stresses and strains thrown by dynamic loads on component parts of hoisting equipment are dealt with, as also are gear testing and certification. A section of the chapter is devoted to equipment for handling heavy lifts.

As in the first chapter, there are paragraphs here that emphasise that at least part of this book is written from an American standpoint. The house-fall system, greatly used on the piers in east coast U.S. ports is described and its advantages listed, but the author's reaction to the dock crane is disappointing. "Of the many advantages of the dock crane listed by some authorities," he states, "the most valid is that the area of deposit is much larger. Other arguments are not always valid. For instance, it is said that the dock crane is better because only one man is needed to operate it, therefore it requires less labour. This argument is not valid if the employer must hire a standard-sized gang, regardless of the

Marine Cargo Operations—continued

operation." This does not seem to be an argument against the value of a particular piece of machinery. Rather, it is a criticism of a labour agreement.

"From the standpoint of port efficiency for discharging ships" he continues, "the yard and stay system and dock crane are not far apart. It appears that the question of dock cranes must be answered in terms of local conditions."

Few ships' officers with experience in ports all over the world would deny that where a modern dock crane can be employed, it is more often than not a speedier purchase than the ship's gear, however rigged. For this reason, quay cranes have assumed greater importance since the speedy turnround of ships became so vital to maritime nations. They can be ready for use immediately the ship is berthed, they are quick-working and they can be employed to increase the number of gangs it is otherwise possible to work in a ship. They also have a distinct advantage over ship's gear when miscellaneous cargoes are being handled and when it is necessary for packages to be placed in a certain position on the quay, in a barge, in the ship's hold or on her deck—especially when the packages are of awkward size or shape. This last point has certainly been made by the author but it is a major and not a minor one.

In this part of the book, in fact, the author's meaning has not always been clear. "One type of dock crane," he states "is a cantilever crane mounted on the roof of the dock shed with level luffing jib. This makes it possible to pick up the cargo from the ship and deposit it on the deck with just two motions—(1) the vertical motion of the hook and (2) the luffing of the boom." The point about level luffing, of course, is that it meets the extremely important need for the hook of the crane to travel in a horizontal path over the whole distance from maximum to minimum radius.

"Materials handling principles and equipment" (chapter 7) is, again, a subject for a book on its own and the author has given it much thought and attention. Modern handling equipment is described, with the implications of using it in ships, on wharves and in sheds. Suitable attention has been paid to palletisation and a table showing a comparison of the man hours required for dealing with loose cargo and palletised cargo respectively is interesting.

Operation	Man-hours required Palletised	Loose cargo
Loading and strapping pallets at shippers' premises	50	—
Loading vehicles at same premises	8	50
Unloading vehicle at berth	9	24
Loading and stowing in ship	37	47
Discharging	24	164
Loading road vehicle at berth	8	54
Unloading vehicle at consignee's premises	9	57
	145	396

It will be seen that, after strapping, there is a saving of man-hours at every point. The saving in gang-time at ship discharge is appreciable.

Ventilation (chapter 8) is also a fundamental part of the subject, as is proved by the example of the carriage of bulk sugar, where the degree of ventilation during the voyage is an important factor determining the state of the cargo when it arrives at the port of discharge. The author has given this subject, too, comprehensive treatment and uses many interesting charts and diagrams in illustration.

The concluding chapter is concerned with research and development in the industry. Among the organisations mentioned (and they are nearly all U.S. bodies) is the Maritime Cargo Transportation Conference which was formed at the joint request of the U.S. Departments of Commerce and Defence to provide guidance on means and techniques leading to improvement in the sea transport of dry cargoes. Reviews of the first two "studies" of the M.C.T.C. —"The ss. 'Warrior'" and "A comparison of conventional and unitised cargo systems"—appeared respectively in the June, 1955 and July, 1956 issues of this journal. How important this section is regarded can be judged from its first sentence. "Generally speaking, it is true that industrial progress has passed the waterfront by during the first half of this century."

This chapter forms a fitting conclusion to a useful book which deals in a comprehensive and often meticulous fashion not only with the efficient and economical handling of cargo but also with good stowage and its effect upon the safety of the cargo and the ship.

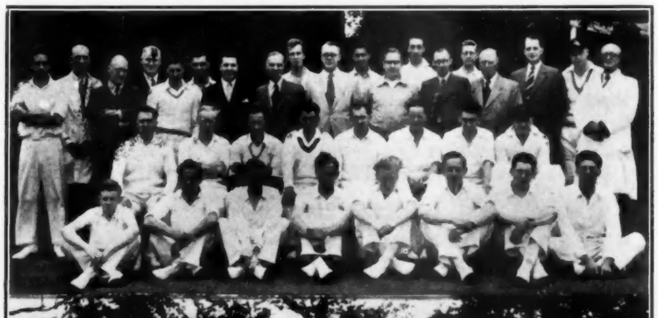
Copies of the book are obtainable from Chapman & Hall Ltd., 37, Essex Street, London, W.C.2, or from "The Dock & Harbour Authority," 19, Harcourt Street, London, W.1. Price £4 4s. 0d. (postage 1s. 6d. extra).

An Inter-Port Cricket Match

Port of London v. Port of Bristol

An occasional item of human interest will, we think, be appreciated by many of our readers. Cricket enthusiasts may be interested in the following which has been sent to us by the Port of Bristol.

During July cricket teams representing the Port Authorities of London and Bristol met for the first time; indeed it may have been the first inter-port cricket match on record.



Top: The P.L.A. and P.B.A. cricket teams and supporters.
Bottom: An incident during the opening of the P.L.A. innings.

The day was fine when the P.L.A. went in to bat on the Bristol ground close to the banks of the Avon. Only once in the course of the innings was the wicket struck and that was by a brilliant throw in from mid-wicket which caught the batsman yards from the crease. All the wickets fell to the P.B.A.'s smart fielding and the P.L.A. were all out after lunch for 143. The P.B.A. batsmen found themselves a little outclassed by the opposing bowlers and were all out for 56.

If the result admitted a certain superiority of London over Bristol as a port it must be added that the importance of the result was negligible beside the good sportsmanship and good fellowship which accompanied this fixture. It was an event which it is hoped will be repeated in future years, perhaps a Port Championship may come from it.

Cargo Increase at South African Ports

During 1955 nearly 50 million tons of cargo was handled at the seaports of the Union of South Africa. This was an increase of 2 million tons over the previous year, and further increases are likely as the result of the implementation of an £8 million modernisation programme of port facilities.

This was announced when the budget for the South African Railways and Harbours was presented recently.

Reconstruction of a Sea Wall at Beira

New Design to Achieve Stability*

By K. G. SORENSEN

The port of Beira is the second largest port of Portuguese East Africa. It has been described by Mr. P. Garde-Hansen in an article in CN Post No. 24, February, 1954.

Before the beginning of this century there was no proper harbour at Beira and all goods were landed on the beach, south of the small river, Chiveve. The beach, however, was rapidly retreating due to erosion caused by wave action and strong tidal currents. The maximum tidal change at Beira is 6.80 m., i.e. between level + 0.30 m. and +7.10 m. above the hydrographic Zero. In order to stop the erosion a mass concrete retaining wall, with toe level at + 1.40 and top level at +8.70, was built during the first years of this century.

Already a few years after the construction of this sea wall the erosion in several places had reached the toe of the wall which began to settle and crack. Since then, it has been necessary at frequent intervals to repair the wall and to dump rock fill and concrete in gunny bags in front of it, in an attempt to prevent a collapse. In spite of all these efforts the wall continued settling and cracking and during the later years certain sections of the wall, over a length of approximately 170 m., began to tilt seawards. It then became obvious that stronger measures would have to be taken in order to avoid a collapse.

The public Works Department therefore made a design for a consolidation of the above mentioned 170 m. length of wall, and called for tenders early in 1953. No tenders were received, however, and the Public Works Department then approached Christiani & Nielsen, whose price for an alternative design was eventually accepted. A contract was signed in November, 1953.

The alternative design for the consolidation consisted of driving a steel sheet wall 8 m. in front of the old wall, the placing of graded stone fill between the sheet wall and the old wall and the introduction of a drained filter behind the wall, preventing accumulation of rain water.

The sheet piles and the piling equipment were ordered for immediate shipment from overseas soon after the contract had been signed, and work commenced in the beginning of February, 1954.

It proved, however, to be all in vain. The deterioration of the wall had gone too far before it was decided to consolidate it. On the 6th and 7th of February torrential rains fell over Beira and on the 7th February, on a spring low tide, an approximately 100 m. long section of the sea wall collapsed completely, partly due to the toe being undercut by erosion and partly due to the extra pressure from the rain water accumulating behind the wall. All contract work was immediately suspended and a temporary protection of sand bags and fascines was placed behind the collapsed section of the wall in order to prevent the sea carrying the erosion too far inland endangering existing buildings. Figs. 1 and 2 show the old wall immediately after the collapse.

A design for the reconstruction of the collapsed section of the sea wall was then studied, but in the meantime, on the 9th of March, another section of the wall slid into the sea, this time due to a rupture in the sub-soil under the wall. Borings carried out later revealed a 2.3 m. thick layer of comparatively soft clay below level Zero. The idea of reconstructing the sea wall in the position of the old wall was now abandoned and it was decided to build a completely new wall behind the old one.

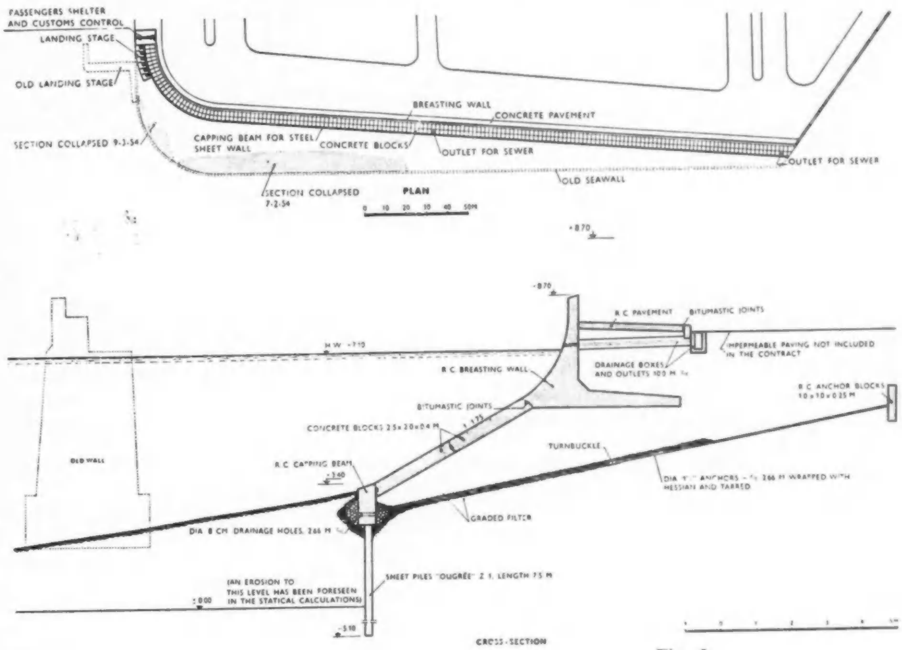


Fig. 3.

General Description.

Several alternative proposals for the new sea wall were made before the Public Works Department in June, 1954, accepted the proposal which will be described in the following.

The new structure which is shown on Fig. 3 consists of a sheet wall of 7.5 m. long

Fig. 1.

Fig. 2.

*Reprinted by kind permission from CN Post, February, 1956.

Reconstruction of a Sea Wall at Beira—continued

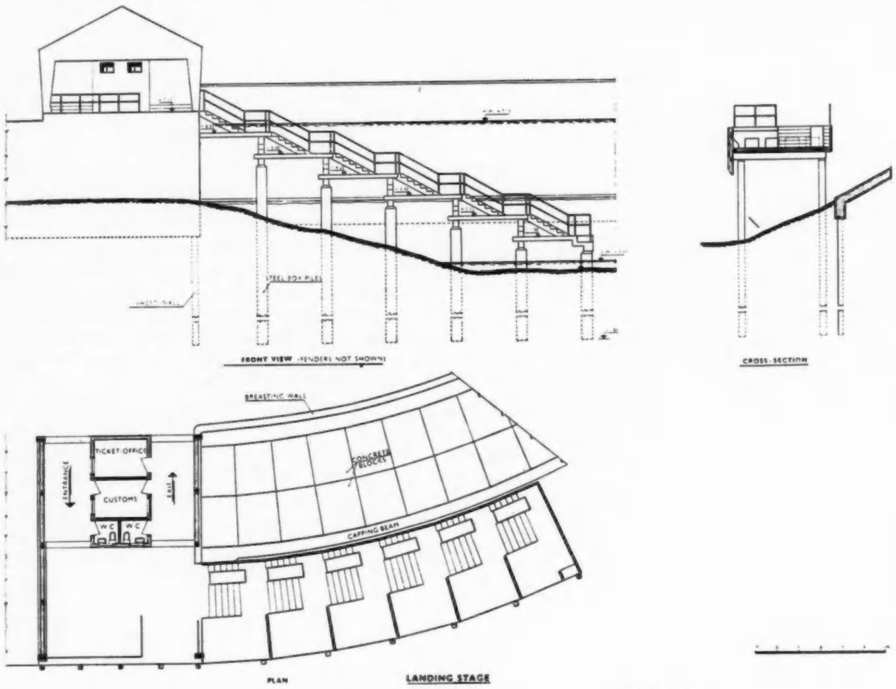


Fig. 4.

Ougrée Z1 steel sheet piles with a reinforced concrete capping beam, an inclined revetment of 2 rows of 2.5 × 2.0 × 0.4 m. concrete blocks with bitumastic joints and a 3.2 m. high L-shaped concrete breasting wall, partly reinforced. The sheet wall is anchored to 1.0 × 1.0 × 0.25 m. reinforced concrete anchor blocks by means of 1¼-in. diameter tie rods. A 10 m. wide and 0.5 m. thick graded stone filter is placed behind the capping beam which is provided with 8 cm. diameter drainage holes. A 3 m. wide reinforced concrete pavement is made all along the breasting wall and drainage boxes, connected to drain pipe leading through holes in the breasting wall, are placed outside the pavement. The total length of the new sea wall is 342 m., including the junctions to the remaining sections of the old sea wall.

When making the design, the reasons for the collapse of the old sea wall were carefully taken into account. The calculations allow for an erosion of the sea bed down to level Zero in front of the sheet wall. This is approximately 3.5 m. below the level of the actual sea bed. Excessive water pressure in the back fill has been prevented, partly by the stone drain discharging through the drainage holes in the capping beam and partly by the drainage boxes receiving the rain water from the impermeable surfaces of the pavement and the road. The paving of the road will be made by the Beira Municipality immediately after the completion of the sea wall. The calculation of the stability of the block revetment further takes into account the variation in the outside water pressure due to the deflection of waves of about 1.2 m. height.

The calculation of the sheet wall, as well as the breasting wall, are based on the theory of rupture according to the principles developed by Dr. Brinch Hansen in his book "Earth pressure Calculations." A great number of the sheet piles had already been supplied for the consolidation of the old wall, but by choosing an appropriate state of rupture for the calculations it was possible to utilise the length as well as the section modulus of these piles in a theoretically economical way.

The future sewage system of Beira includes two 50 cm. diameter outfalls through the new sea wall. These outfalls lead through the block revetment and therefore had to be made simultaneously with the construction of the new wall.

The landing stage, which has 7 platforms at different levels, as shown in Fig 4, is made from prefabricated reinforced concrete elements, viz. stair elements, platform elements and transversal "Vierendeel" girders. The elements are supported on 12 steel box piles filled with concrete. Part of the width of the stairs is made as a ramp for the shifting of heavy goods to and from launches, loading or discharging at the landing stage.

At the top of the landing stage is built a shelter for passengers awaiting embarkment and some small offices, etc., for the Customs Control.

Construction Procedure

Earthwork, etc.

It will be seen from Fig. 3 that the new sea wall was placed so far behind the old wall that this could serve as cofferdam for the excavation required for the construction of the new wall. Behind the collapsed sections of the old wall cofferdams were built from sand, protected from the sea by rows of fascines, placed between timber poles driven into the sand, and by broken concrete from the demolition of pavements and buildings, which had to make way for the new wall.

In order to keep the bottom of the working pit dry it was necessary to keep two self-priming 6-in. centrifugal pumps working continuously with another ordinary 6-in. centrifugal pump as a stand-by. A few times water at high tide broke through holes in the old wall into the working pit, causing delays, but never any serious damage.

Piledriving.

Until June, 1954, it was still uncertain whether or not the new sea wall was going to be constructed and when the contract was finally agreed upon it was not possible to wait for the import of a conventional pileframe from overseas. It was therefore necessary to build a pileframe from materials available locally (Fig. 5).

Five double piles could be pitched in each position of the pileframe. When one double pile had been pitched it was immediately after driven until the top was just above the lower guide walings. When the last of the five double piles had been driven to this depth it was left to serve as support for the piles to be pitched in the next position of the pileframe. The guide walings were then pushed aside and the other four double piles plus the last double pile from the previous position of the pileframe were driven to about 0.7 m. above their final depth. Using a dolly, the driving was finally completed.

Fig. 5.

Reconstruction of a Sea Wall at Beira—continued

When the piling crew after some time had become used to the special working methods required with this unusual type of piledriver a maximum daily output of five double piles during normal working hours was obtained.

Capping Beam, Filters and Anchors.

It proved impossible to complete the excavation for the lower part of the filter and for the capping beam (see Fig. 6) without special precautions being taken.

The infiltration of ground water and sea water was so strong that the bottom of the excavation was continuously being filled with sand from the slopes, 2.10 m. long, tongued and grooved sheeting planks were therefore driven in front of the steel sheet wall using a jet pump and maces.

The anchor blocks were pre-cast and placed by hand and the tie rods were tightened after fill had been placed in front of the anchor blocks. The turnbuckles and the nuts and washers were then covered by cement mortar for protection against corrosion.

Concrete Block Revetment.

All the concrete blocks were pre-cast, but for the blocks through which passed the outfalls for the sewers. The transport from the block yard took place on trolleys on Decauville track. They were placed by means of a 5 ton chainblock on a 14 m. long gantry. This gantry had one long leg travelling on a rail placed on the capping beam and one short leg travelling on a rail placed on the first part of the re-fill over the anchor blocks. Three to five blocks were placed per day.

Breasting Wall and Pavement.

These did not present any unusual features, but for the curved front forms for the breasting wall. These forms were made in sections, each 4-ft. by 8-ft., consisting of $\frac{1}{8}$-in. steel plates screwed onto curved stiffening ribs made from timber. During the erection they were held in position and adjusted by tie rods with turnbuckles placed between the top of the form elements and the lifting holes in the revetments blocks, as shown on Fig. 7. The form elements for the curved sections of the breasting wall were narrower at the top than at the bottom. These elements were later used also for the straight sections by turning every other element upside down.

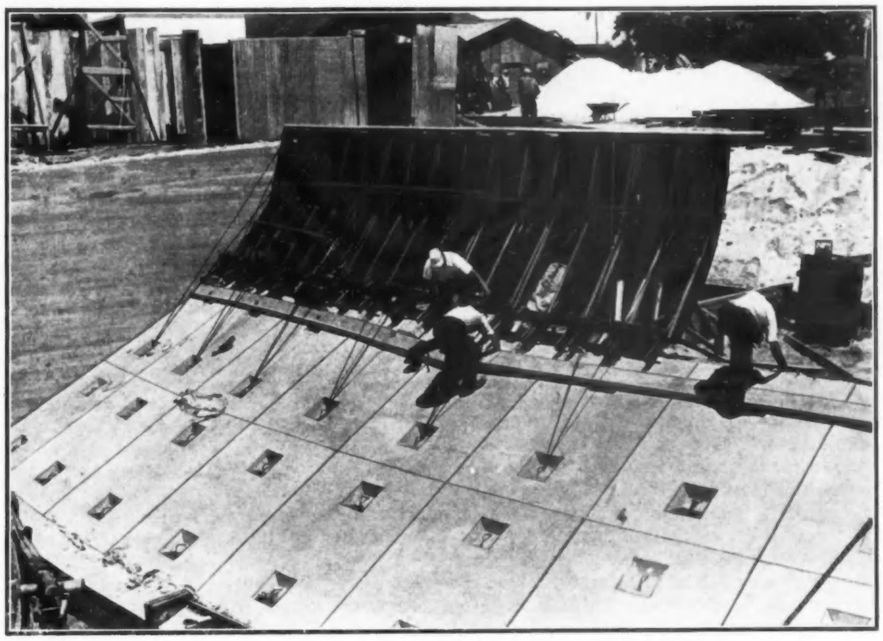


Fig. 7.

Landing Stage.

The piledriver for the sheet piles was also used for the driving of the box piles for the landing stage. It was altered into a cantilever pileframe travelling on the pavement behind the breasting wall and on a staging erected on the capping beam of the sheet wall.

Further the pileframe was used for the placing of the pre-cast elements. It was found, however, to be much easier to use a hand-winch instead of the steam-winch for the placing of the elements.

The sea wall was completed in July, 1955, and the landing stage was completed in October, 1955. The demolition of the old wall in front of the new wall, but for an approximately 30 m. long section which has been demolished for the construction and the use of the landing stage, will be demolished by the Public Works Department over a number of years.

Fig. 6.

Proposed River Port for Patna, India.

A scheme to construct a port on the Ganges River at Patna, which is a railhead on the Indian Eastern Railways, is being considered by the Indian Government, and a survey of the area is nearing completion. The site selected for the river port is Digha Ghat, and the scheme envisages the building of three or four berths for river craft, transit sheds, stockyards and approach roads.

India's Second Five-year Plan includes proposals for the development of six river ports in all: Patna, Dhubri, Karimganj, Manihari, Gauhati and Pandu.

There is also a scheme under consideration to instal radio-telephone communication on the Brahmaputra and Ganges rivers. Such a system, it is claimed, will ensure efficient communication between river stations and river craft on the move.

Port Operation and Information Service at Southampton

R/T Communications and Harbour Surveillance Radar Schemes

THE Southampton Port Operation and Information Service established a few years ago aims at co-ordinating shipping movements and ensuring the efficient operation of the port and the safety of life and property. In furtherance of this objective, the Board has now decided to establish a V.H.F. R/T system of communications and a Harbour Surveillance Radar at their Signal Station at Calshot. The preliminary details of the scheme have been set out in the Board's Notice to Mariners No. 22 of 1956.

When the Minister of Transport gave his consent in 1950 to the construction of the Esso Marine Terminal at Fawley, the Southampton Harbour Board agreed to the suggestion of the Chamber of Shipping and the Liverpool Steamship Owners' Association that the movements of shipping using the port should be co-ordinated. Since that time, discussions have taken place between the Board and the Ministry of Transport and the General Post Office, regarding the introduction of a system of Port R/T communications and Radar information. By coincidence, developments in the field of marine V.H.F. R/T communications and the investigations for establishing a Harbour Surveillance Radar at Calshot Signal Station, have now simultaneously reached the stage where finality in the equipment of the Port Operation and Information Service could be considered.

The efficiency of the Harbour Patrol, which is an important part of the Service, has been considerably improved with the bringing into service of the new patrol launch "S.H.B. Triton" (a description of which was published in last month's issue of this Journal). The increased speed of this launch will enable the Patrol to keep ahead of vessels entering and leaving the port. The radar and echo sounding equipment on the launch will enable the Patrol to operate efficiently in reduced visibility, particularly when a large vessel has been caught in a fog and smaller vessels not fitted with radar are fouling the channel, in which case the Patrol would be able to shepherd them to a safe anchorage.

Since its inauguration, however, the Port Operation and Information Service has operated under considerable difficulties, due mainly to the lack of communications and of an accurate knowledge of the positions of vessels and their speed of advance whilst navigating the main navigable channel. The use of medium frequency R/T communications between vessels and shore stations is not permitted as this frequency band is already congested and there have been difficulties in the past in introducing V.H.F. R/T communications owing to the lack of any international agreement.

Two developments of recent date, however, have altered the whole outlook. Firstly, in July, 1955, the Postmaster General announced that the British Government had decided to change from a system of amplitude modulation to frequency modulation in V.H.F. R/T communications, thereby falling into line with other nations. Secondly, at the Baltic and North Sea Radio Telephone Conference, which was held at Gothenburg in September, 1955, it was originally intended to discuss medium frequency only, but it was agreed at the request of the Shipowners' Organisations to discuss marine V.H.F. R/T communications, and at that Conference, an informal frequency plan was agreed. The Gothenburg plan is similar to the system of R/T communications at present in use on the United States Seaboard and is under consideration for certain Continental ports.

The diagrammatic presentation of the Port R/T Communications System (Fig. 1) is set out in the Notice to Mariners already referred to. The following frequencies, which are subject to confirmation, have provisionally been allocated by the General Post Office for the channels as numbered on the communications chart.

Channel No.	Frequency (in Mc/S)	Channel No.	Freqnency in Mc/S)
1	156.8	7	156.4
2	156.6	8	156.9—161.4
3	157.0—161.5	9	157.2—161.7
4	157.1—161.6	11	156,3

The lower frequencies on the double frequency channels are to be

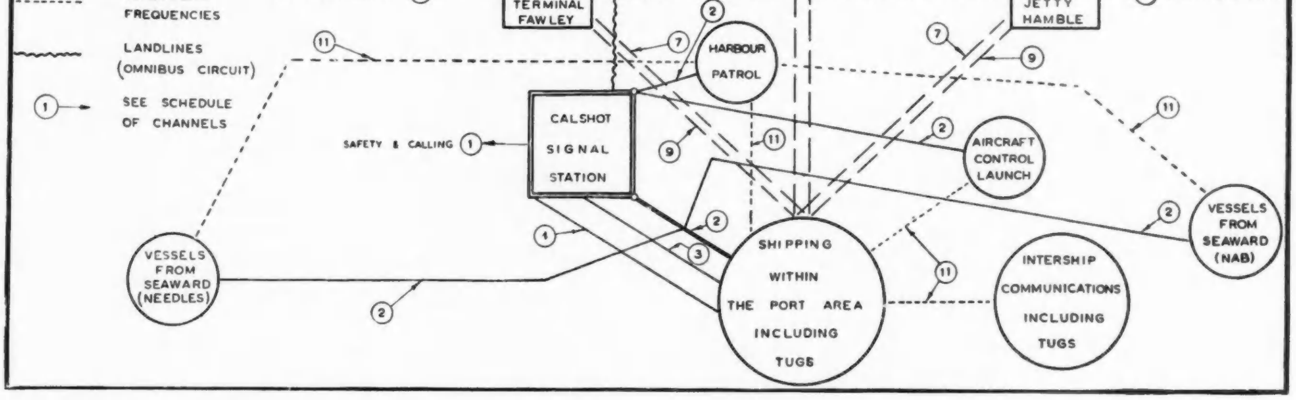


Fig. 1. Operational Requirements Chart.

Port Operation and Information Service at Southampton—continued

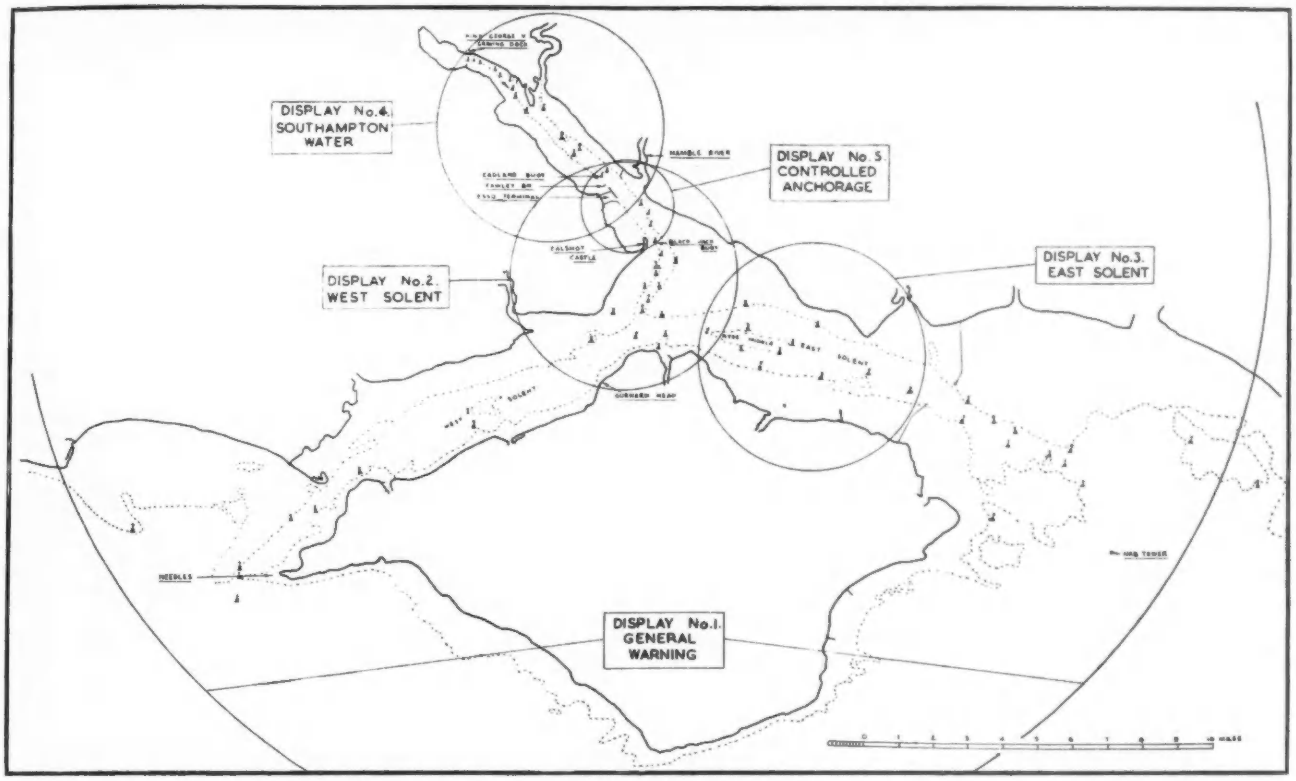


Fig. 2. Details of Displays.

used for ships' transmission. The British Government proposes having consultations in the near future with other countries at Warsaw regarding the implementation of the Gothenburg plan, and will discuss with them the Southampton Port R/T Communications System and the frequencies to be used.

The aircraft control launch shown on the Communications chart is not mentioned in the Notice to Mariners. The Board is the licensee of the Marine Aerodrome situated on Southampton Water, and the Harbour Master through his representative—the Duty Patrol Officer—is responsible for regulating all movements of flying boats with respect to shipping using the Port. In the event of the necessity of withdrawing the patrol launch from the flying area, it is intended that the Duty Patrol Officer will transfer to the Aircraft Control Launch, and will maintain contact with the Operations Officer in Calshot Signal Station using portable R/T equipment fitted with the same frequencies allocated to the Southampton Patrol Launch, as indicated in the Notice to Mariners. As a temporary measure only, the General Post Office is permitting the use of medium frequency R/T equipment, whilst the V.H.F. R/T equipment is being installed.

An omnibus telephone circuit connecting the following offices with direct lines to avoid any delay in communications has been installed by the Board:—

1. Harbour Master, Southampton Harbour Board.
2. Dockmaster, Southampton Docks.
3. Calshot Signal Station, Southampton Harbour Board.
4. The Esso Marine Terminal, Fawley.
5. The Shell-Mex Jetty, Hamble

Complementary Functions.

Port R/T communications and harbour surveillance radar are complementary assets and in certain circumstances, one is of little use without the other. For example, in the case of the collision in fog between two petroleum vessels in the main navigable channel below Calshot Signal Station on January 21st, last year, the operations officer knew that one had passed outwards, but had no knowledge that the second vessel was entering the Port. This would not have been the case with an efficient R/T system, but even so, without a harbour surveillance radar, the port operations officer, in similar circumstances, would not be able to warn either vessel that they were standing into danger.

The complementary functions of a harbour radar and R/T can also be appreciated in the case of a vessel underway in bad visibility. Without radar the operations officer would be repeatedly requesting the position of a vessel by R/T. This would tend to annoy both the master and the pilot, with the result that the set would probably be switched off and the Port Operation and Information Service would be regarded as a nuisance rather than an advantage.

In the case of vessels caught in fog, the bearing and range discrimination of the harbour radar will have to be of a high order and provide cover for the whole of the Port area on a sufficiently large natural scale. The object of harbour radar is not to bring about conditions within the Port whereby normal navigation should be attempted in fog. The largest vessels using the Port have entered at night when the visibility has varied from half to three quarters of a mile, that is, when the duty port operations officer at Calshot has been unable to see either Calshot Light Vessel or the Esso Marine Terminal, Fawley. It is under these conditions that harbour radar will be invaluable to the operations officer in obtaining and passing information as to the state of the main navigable channel and the positions and speeds of vessels navigating therein. Even in conditions of good visibility, the harbour radar will be able to provide quicker and more accurate information than can be estimated by eye

Five Radar Displays.

A tower 130-ft. high to accommodate a 25-ft. radar scanner will be erected close to Calshot Signal Station. In the Station there will be three 15-in. diameter viewing units, each capable of presenting by selection, any one of five displays. With reference to the attached Radar Coverage Chart (Fig. 2) displays Nos. 2, 3, and

Port Operation and Information Service at Southampton—continued

4 will normally be used. To avoid confusion when interpreting the radar picture, each of these displays has the same natural scale of 1/31,600 and it will be seen that adjacent displays overlap. In addition, there will be the large scale display of the Fawley/Calshot area, No. 5, with a natural scale of 1/15,000 and the general warning display No. 1, with a maximum range of 18 nautical miles. There is some screening of the area in the vicinity of the Solent Banks by the trees on the high ground to the West of Calshot Signal Station, and consequently there is no large scale display for the West Solent, other than covered by the No. 5 display.

There are at present only six tankers of over 32,000 d.w. tons calling at Southampton, but it is anticipated that there will be a steady increase of these vessels and by 1960 it is expected that 50 per cent. of the ocean-going tankers will be over 32,000 d.w. tons. The construction of a second refinery on the east shore of Southampton Water is also under consideration. To be effective, therefore, the Harbour Master has recommended that the build-up of the Port Operation and Information Service should keep well ahead of that of the large tanker, so that before 1960, both equipment and technique will be well established.

In addition to the many conferences with the Ministry of Transport and Civil Aviation and the General Post Office, on the technical aspects of the R/T scheme and the Harbour Surveillance Radar, the Board has also had discussions with the Chamber of Shipping and Liverpool Steamship Owners' Association, in order to test the reactions to the proposed R/T scheme. The Chamber of Shipping, acting on behalf of both organisations, has approved it in principle and it is hoped, that in due course, all shipping companies will equip all vessels using Southampton with the necessary facilities to enable them to link-up with the Board's R/T system.

It is the Board's intention to call a meeting of representatives of all affected users of the Port, later this year, to explain further the Board's proposals when representatives of the Ministry of Transport and Civil Aviation, the General Post Office and the Radio Advisory Service will be present.

Radar Installation Ordered.

Tenders have now been invited for the supply of the V.H.F. R/T equipment, but a Contract has been placed with Decca Radar Ltd., for the Harbour Surveillance Radar, Type 32, following extensive trials which have been carried out under the auspices of the Board, in conjunction with the Ministry of Transport and Civil Aviation in a technical advisory capacity.

The Decca Radar Type 32 has an extremely narrow beam width of $\frac{1}{3}$ deg. and a very short pulse length of 1-20th microsecond. It will provide a radar picture of outstanding clarity of the port of Southampton and its approaches. Large-scale radar pictures are presented on three displays of 15-in. diameter with electronic means of measuring buoy and ship positions to a high accuracy. The radar will give cover from King George V Dry Dock in Southampton to No Man's Land Fort in the East Solent and to Gurnard Head in the West Solent. In addition, general warning cover will be given out to the Nab Tower in the east and to the Solent Banks to the west. A special feature will be a very large-scale presentation of the anchorage off Fawley Refinery.

Among other uses of the radar will be to:—

(i) Provide ships entering and leaving the port with information of their position, relative to any navigational mark (this information is of particular importance in assisting vessels anchoring in the controlled anchorage to anchor in a correct position clear of the main channel).

(ii) Indicate the position of buoys in order that irregularities may be detected and communicated to ships.

(iii) Provide information as to the movements of shipping to the board's patrol officer engaged on flying boat control duties.

(iv) Check the movements of hopper barges carrying spoil and other refuse on passage and ensure that they proceed to the authorised spoil grounds.

(v) Pass information to tenders carrying passengers so as to assist them to contact passenger vessels anchored in the Solent when visibility is poor.

Laminated Timber for Port Buildings

Modern Technique Facilitates Construction

To make the fullest use of the resources of overseas territories, it is essential that dock and harbour installations should be improved to provide increased undercover storage for goods in transit and to facilitate the handling of materials for the various constructional projects. To achieve this, the building costs of under cover storage in port must be kept to the absolute minimum consistent with maximum efficiency. To meet this need, a constant search is going on for cheaper and simpler methods of construction to enable material and labour costs to be kept as low as possible. One of the latest developments in timber construction which meets this demand is glued laminated timber, already widely used in the U.S.A. and on the Continent, particularly in Holland and Belgium.

Glued laminated timber consists of a number of thin boards of selected natural timber glued together to produce a structural member of whatever size, length, shape or strength may be required for a particular purpose. The glues used are of lasting strength—even under tropical conditions — and the glue line produced under strictly controlled conditions is invariably stronger than the wood laminae.

Glued laminated timber, while retaining the easy working properties of solid timber, has considerable advantage over natural timber. Members can be built up to any section or length, and it is possible to increase any particular section of a member locally to develop additional strength where it is required without wasting material elsewhere. This often allows greater freedom in design without an appreciable excessive increase in cost.

Natural timber can be bent to curved shapes provided the thickness of the pieces is relatively small compared to the radius of the curve. Large sections cannot be bent at all or only with difficulty by steaming. By the use of thin boards as laminae which have sufficient elasticity to be bent to shape without creating undue stresses in the fibres, curved pieces can be built up, and when glued together become a solid curved timber member which will retain its given shape and yet possess properties of a solid piece of timber, plus the added strength due to the lamination.

The influence of defects in timber is minimised by the use of G.L.T. Knots, splits, shakes and cross grains are not superimposed in successive laminae and the allowance that has to be made for them in calculating permissible stresses is much reduced.

Because the thin boards are already seasoned before gluing, laminated timber, even in the largest sizes, is fully seasoned throughout when manufactured. In consequence, there is a complete absence of the progressive shrinking and splitting which may accompany the slow drying out, over a long period of time, of large sections of natural timber.

It has considerable advantages in regard to fire hazards since the moment of collapse of G.L.T. members is much delayed as compared with unprotected steel sections of similar strength.

One of the applications of the G.L.T. principle is the construction of bowstring trusses. These trusses are particularly suitable for use in the construction of sheds and warehouses and can be economically constructed for spans between 50-ft. and 150-ft. without difficulty. They appear to have definite possibilities in newly developed areas overseas where extensive storage space is often required as rapidly and cheaply as possible.

Their great advantage lies in the ease of erection. No specialised labour is required since the trusses are lifted by crane to rest upon timber, concrete or steel columns, or load-bearing walls. Fixing shoes are supplied with the trusses and the process of fixing is merely a question of bolting the truss to the column or wall.

A further benefit gained by the use of these trusses lies in the fact that they are unaffected by the severe atmospheric conditions often met in coastal and industrial areas. In moderate climates therefore problems of corrosion and repainting do not arise.

Roof cladding is a comparatively simple operation. Any normal roofing material can be used, being fixed to the timber purlins by nails and drivescrews. For speedy erection, the lighter forms of

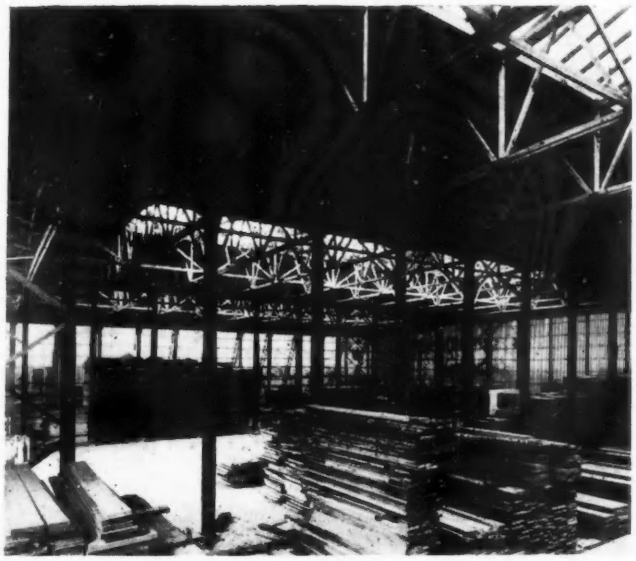
Laminated Timber for Port Buildings—continued

covering such as close boarded timber or plywood with bituminous felt covering, curved corrugated asbestos or galvanised iron sheets are recommended. Any of the usual forms of lighting and ventilation can be incorporated.

If required, a satisfactory suspended ceiling can be prepared by nailing insulation board to the underside of the timber purlins.

G.L.T. trusses and purlins are cheaper than comparable roofing members in other materials, and trusses can be specially designed to cope with individual requirements.

The photograph shows sheds with 60-ft. bowstring trusses spaced at 12-ft. centres. The loading which these trusses were calculated to withstand is 25 lbs. per sq. ft. including self load and superimposed load (15 lbs. per sq. ft. snow load), plus all modifications introduced by unequally distributed loads and wind loads. The rise in the trusses is 8-ft. The top chord consists of 2 curved members (radius of curvature 60-ft.) each 2-in. by $6\frac{1}{8}$-in. (7 laminae each $\frac{7}{8}$-in. thick). The bottom chord in this instance consists of 2 pieces of 2-in. by $4\frac{3}{8}$-in. (cambered $3\frac{1}{4}$-in.), there being 5 laminae of $\frac{7}{8}$-in. each. The bracing consists of 2-in. by 3-in. solid timber. The



Interior view of shed with laminated timber roof.

heel plates are of steel and there are 3—$3\frac{1}{2}$-in. square connectors on $\frac{3}{4}$-in. bolts holding each of the 2 bottom chords to the heel plates. The heel plates are provided with a bearing plate which is bolted to the angle cleats in the columns with 2—$\frac{3}{4}$-in. bolts. The bracing in solid timber is bolted between the top and bottom chords with $\frac{1}{2}$-in. bolts with adequate connectors where required. The timber used throughout is unsorted Swedish Redwood of best brands.

These trusses have already been used in Britain for the construction of timber and other storage sheds and plans are now being prepared to facilitiate their use with specially treated timber components in the construction of garages and factories.

G.L.T. Bowstring Trusses designed and manufactured by the Rainham Timber Engineering Co. Ltd., all conform to the provisions of British Standard Codes of Practice C.P. 112 (1952). The glues used are of the area formaldehyde and resorcinal gap-filling type; urea being used for structures in the normal conditions of the United Kingdom and for severe conditions, resorcinal mixed with a suitable hardener. These comply with BS 1204 : 1945.

Another Company, engaged for some time past in the manufacture of glued timber lamination, is Kingston (Architectural Craftsmen) Ltd. of Hull. This Company, which has already produced a number of laminated timber arches, has recently received an order for the design and manufacture of 8 complete and 4 halves laminated timber arches, having a span of 75-ft. with a ridge height of 33-ft. 6-in. These are claimed to be the largest arches yet used in an industrial building employing this technique, and are to be installed in a new dyehouse for The Birstall Carpet Company, Ltd. The special significance of this order lies in the fact that these arches were originally designed in timber in the belief that timber would withstand the decay hazards of the manufacturing processes of the dyehouse better than either steel or concrete. Hitherto, most timber laminated arches have been ordered as an alternative to steel or concrete rather than as a specific requirement.

The durability of the glue was of considerable importance in the manufacture of the laminated arches, and a fully weatherproof glue able to withstand the severest conditions of exposure was considered essential. The actual glue used was Cascophen RS. 240-M resorcinal resin glue, manufactured by Leicester, Lovell and Co. Ltd. of Southampton.

It is likely that the development of G.L.T. and its application to specialised building techniques can be of substantial assistance in certain port construction work. The simplicity of handling and erection and the reduction in maintenance requirements are advantageous in that they lead to a lowering in construction costs, while the ability to use, under certain conditions, lighter foundations can lead to radical changes in site usage. The design and layout of storage buildings can also be improved, since the need for central supporting pillars is usually dispensed with. It is claimed that glued laminated timber can make an important contribution to the development of backward areas in many parts of the world.

Obituary

Mr. Harry Hopperton

It is with regret that we record the death of **Mr. Harry Hopperton, J.P., M.Inst.T.**, a former Provost of Ardrossan, which occurred on 24th July last, at West Kilbride. Aged 73, Mr. Hopperton retired as Director in Charge of Ardrossan Harbour Company in May, 1951, but remained an ordinary director until his death.

A man of wide business experience, Mr. Hopperton was a native of Malton, Yorkshire. He took up his duties in Ardrossan as general manager of the Harbour Company in 1922, and was appointed Director in Charge in 1939.

Mr. Hopperton started work as a junior clerk in the L.N.E.R. Goods Office in Hull. His interest lay in the traffic side of the business and he was promoted to positions which led to Liverpool where he developed new traffic for the railways and canals.

In 1912 he was appointed Traffic Manager at Leith Docks and served in the R.N.V.R. from 1914 to 1918. He was appointed Traffic Manager at Preston Docks in 1919 and in 1922 he became general manager of the Ardrossan Harbour Company. While serving in this latter capacity Mr. Hopperton saw the gradual development and modernisation of the port and was responsible for introducing the oil business which established the present Refinery under the Shell organisation. This development required the construction of a deep water berth for modern ocean-going tankers and the reclamation of a large area of land from the sea.

In 1939 the port came under the temporary control of the Ministry of Transport and at the same time became an important naval base.

Mr. Hopperton was a founder member of the Institute of Transport, a member of the Employers' National Council for Dock Labour and its General Purposes Committee and he was also a member of the Joint Conciliation Committee for Dock Labour. He was an important witness in the Shaw inquiry with particular regard to piece-rate questions.

Modernization of Belgian Inland Waterways

The Belgian Government recently announced a ten-year plan (embodied in a Bill) to improve and develop several of the country's inland waterways. The plan will make possible the passage of barges of far larger size than hitherto. The appropriations will total at least 16,000,000,000 francs and may possibly be increased. The improvement and development of these waterways is of particular interest to the main industrial centres of the country.

Oil, Coal and Grain Handling Plant at Iskenderun, Turkey

By Dipl.-Ing. HERMANN DIETRICH
(Chief Engineer, Kampnagel, A.G.)

TURKEY has the advantage of being bordered by the sea on threequarters of her coastline and on both her Mediterranean and Black Sea coasts there are a considerable number of natural ports. Most of these ports can trace their history back to the ancient Greek and Phoenician colonies. None of them, however, has kept pace with the growth of modern trade and all too often they are congested because of the lack of adequate berths and handling facilities. In many of them, indeed, loading and unloading still has to be carried out by lighterage. It is the intention of the Turkish Government to improve these conditions as quickly as possible, especially in view of the country's steadily growing foreign trade, and they have drawn up a programme for the rebuilding of their harbours which is to be executed over the next few years.

One of the most urgent tasks was the development of the port of Iskenderun (formerly Alexandrette) which is situated on the Eastern Mediterranean near the Syrian border. In view of its connection with the Baghdad railway, it has always been an important transit port to the Middle East and it also can be used for by-passing the Suez Canal. Recently it has become more important to Turkey as the nearest port through which can be exported the agricultural and mineral products of the South-Eastern provinces.

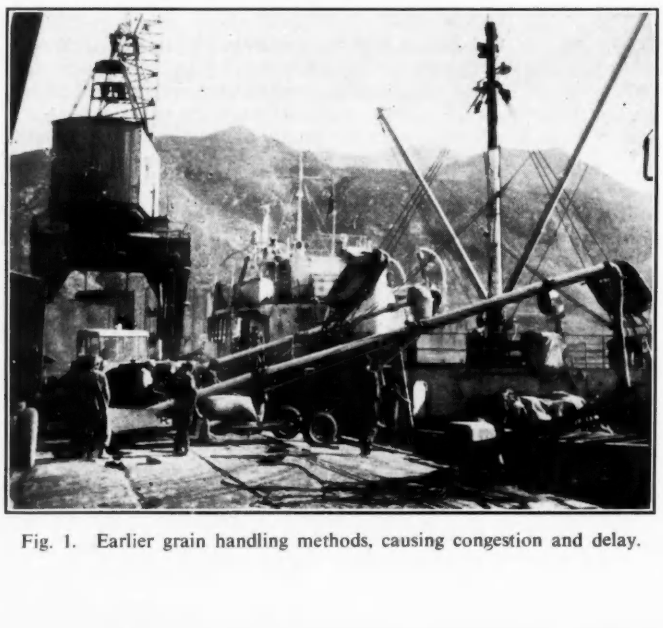


Fig. 1. Earlier grain handling methods, causing congestion and delay.

The development of this natural harbour, which is enclosed on three sides, and offers good protection from the strong surf of the Eastern Mediterranean, was begun for strategic reasons during the 2nd World War by the Americans. A strong jetty was built, based on concrete piles and approximately 600 metres in length, at which could be berthed large sea-going vessels. At that time the jetty was equipped with a double track railway and with four English 6-ton luffing cranes. This plant was principally used for general cargo shipments to the Near East.

In the past ten years, however, the growth of grain and cotton production in the south-eastern provinces of Turkey, and the newly exploited deposits of chrome and iron ore in the same area, has made imperative the need for bulk handling equipment at the port. The temporary ore and grain handling installations at present in use have only been able to solve a fraction of the port congestion and ships are held in the harbour for long waiting periods.

The illustration (Fig. 1) shows the uneconomical method by which the grain has hitherto been discharged from railway wagons with the use of mobile pneumatic units and worm conveyors. In comparison with a continuous belt conveyor, these units are able to handle only about a fifth of the turn-over, and this, in spite of simultaneous operation of several units, and a comparatively large labour force. Furthermore, all general cargo handling had to be stopped during the grain loading, and there was the considerable annoyance of dust.

Development of the Facilities.

Rather than construct a second storey on the existing jetty, i.e. to construct a covered bridge, leading out to the jetty head over the jetty road and railway tracks. On the bridge level, grain and ore could be loaded direct into the ships and coal could be discharged from the ships without interference to the general cargo handling with its rail and lorry traffic on the jetty. The left side of the jetty would be reserved for the berthing of the grain ships, the right side for the ore carriers, and the discharge of coal would be carried out on either side, depending upon which facility was not in operation at the time. Furthermore, the marshalling yards for the coal, ore and grain transport were to be situated on the mainland away from the general cargo rails. The project was thus based on the recognition of the fact that bulk goods can only be handled economically on a large scale by means of belt conveyors.

In planning the handling plant, sufficient facilities had to be provided to handle over 200,000 tons of ore and 200,000 tons of grain per year. Provision also had to be made to handle approximately 100,000 tons of Turkish coal which is delivered to this area by ships from Black Sea ports. It was also necessary to cut down the loading and unloading time for the freighters, as long waiting periods considerably increase freight rates. Accordingly, the following outputs were estimated:

Grain, handled at present 300 (max. 400) tons per hour.
Grain, handled in future with a second conveyor belt in operation 600 (max. 800) tons per hour.
Ore 250 (max. 333) tons per hour.
Coal, handled at present 100 (max. 133) tons per hour.
Coal, handled in future, after erection of new luffing grab cranes 200 (max. 266) tons per hour.

In joint studies, the planning bureau of the Turkish Ministry, Messrs. Kampsax, the Consulting Engineers from Copenhagen, and the German Contracting firm of Kampnagel AG, Hamburg, chose the solution shown on the layout plan (Figs. 2 and 3) as the most favourable of several alternative proposals.

It is a generally accepted fact that the primary condition for continuous ship loading and unloading by any major handling plant is the creation of large storage areas. A contract was therefore granted to Messrs. MIAG of Brunswick for the erection of a large grain silo with a 20,000 ton capacity. In this plant, which is equipped with the most modern machinery, the grain which has arrived by either rail or road is dried and cleaned.

A large storage area of approximately 50,000 tons capacity was provided for storing the ores of various origin, where they are stacked in piles 6 metres in height awaiting transfer by grab, trolleys and belt conveyor to the ships' holds. It is planned to extend this storeyard further at a later date.

An area of about 120 sq. metres with a storage capacity of about 20,000 tons has been set aside for the temporary storage of coal after unloading from the ships while awaiting inland distribution by road and rail transport.

Altogether this handling plant extends over an area of one kilometre, as can be seen from the title illustration.

Construction of the Plant.

In order to cover the 600 metre long jetty with a bridge broad enough to accommodate four parallel conveyor belts, it was necessary to carry out the difficult task of reinforcing the old jetty and extending the narrow access to the road on both sides to bear the additional pressures of the bridge supports (Fig. 4). This work had to be executed without serious disruption to the everyday operations on the jetty and its narrow access.

The site planned for the ore and coal storage yards was partially flooded and the soil consisted of layers of swamp and clay which had to be excavated and then filled with gravel. Because of these unfavourable soil conditions, it was found necessary to provide long reinforced concrete piles for supporting the 300 metre long track needed for the heavy crane bridges which would travel over the storage yards. This precaution was taken to prevent subsequent sinking of the crane track.

All this civil engineering, pile-driving and concrete work was carried out in less than a year by Turkish contractors working to designs drawn up by Messrs. Kampsax. All the reinforced concrete piles were constructed on site. The whole storage area was reinforced with a concrete surface to bear the weight of the heavy grabs. In view of the strong radiation from the sun, the newly made sections of concrete had always to be kept covered and moist.

Work was commenced as soon as possible on the construction of the grain silo, and a team of engineers drawn from the two Hamburg firms of Kampnagel and Stahlbau Eggers, began erection

Fig. 2 (above). Plan of the new handling plant on Pier 1 and Fig. 3 (below). Aerial view of the construction site.

Handling Plant at Iskenderun, Turkey—continued

Fig. 4. Foundations of the support for the conveyor bridge connected with the pier reinforcement.

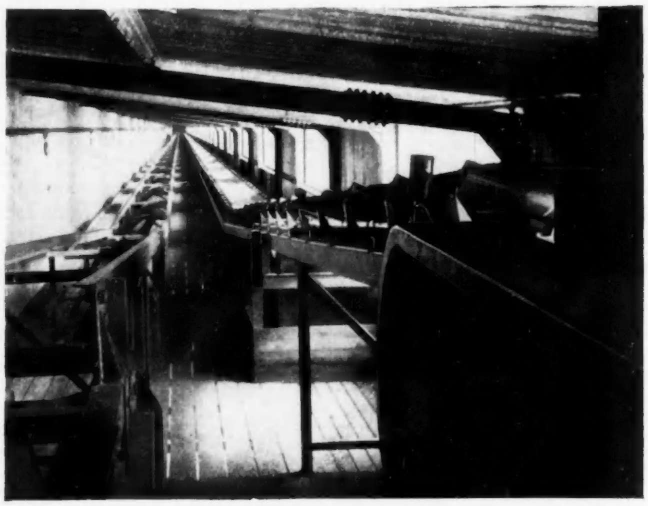


Fig. 5. View of part of the grain conveyor leading from the silo to the mole head.

of the extensive conveyor systems and loading bridges with the aim of completing the work within a year.

The Turkish Government was anxious to take into service the grain storage and handling plant as soon as possible, and this installation was therefore given priority over the ore and coal handling systems also to be installed. This pressing need for sufficient equipment to store and export the grain as quickly as possible arose from the severe lack of adequate facilities. Owing to the rapid mechanisation of agriculture since the last war, there was an appreciable increase in the supplies of grain which often had to be stored for months either in pits or in large heaps with no protection from the weather. The result was that much of the grain was lost through damage or through being blown away by the wind.

The Grain Handling Plant.

By the end of 1955, however, the grain silo and conveyor belt were sufficiently completed to enable them to be used for the first time and the fully mechanical grain loading of a freighter was carried out in December of that year. The relatively high number of German fitters, assisted by Turkish labour (in an approximate ratio of 1 : 1) worked well, considering that the Europeans were unaccustomed to the unusually hot climate of mostly 50°C. during the day.

Three successive belt conveyors carry the grain from the silo to the ship's hold in an uninterrupted stream. All the grain belts are 800 milimetres in breadth and run at a speed of 2.6 m./sec. They are driven over precision spur wheel gearings by A.C. short circuit rotor type motors with a special winding for 50° ambient temperature and with tropical insulation. In order to prevent an overload on the rubber belts and drive elements when switching on the long belts, all the belt conveyor drives are equipped with smooth starting clutches for starting delays from 5 to 10 seconds. This also prevents an overload of the generator plant. Fig. 5 is a view of some 400 metres of the conveyor system.

A shorter belt conveyor, attached to the main belt has a discarding carriage, travelling on about 160 metres of its length. This carriage feeds the grain to the loading tower, which can be moved along the quay. Instead of being driven electrically, which would have required long and dangerous contact lines, the carriage is driven mechanically by the belt. For this, the rotation is transferred to the travelling gear by a deflecting drum and a two-way gear with a disengaging coupling. Along the length of belt travelled by this discarding carriage, the corrugated sheet lining of the belt bridge has sliding doors at intervals of 4.7 metres, so that the feeding of the grain may be adapted to any position of the ship's hatches.

The first grain conveyor belt is now fully complete and equipped with a loading tower, and work is in progress on a second and parallel conveyor. Once this system has been installed, two different types of grain, for example wheat and barley, may be loaded simultaneously into different hatches entirely independently of one another. It will also be possible for both systems to be connected up to either one of the two loading towers.

The design and extent of the belt conveyor bridge are clearly shown in Figs. 6 and 7, and it can also be seen that this installation does not interfere with the rail and lorry traffic on the jetty. It is further intended to construct a shelter for general cargo in transit by lining some of the intervals between the supports of the belt conveyor bridge with corrugated iron. This plan, however, will only be undertaken after the whole of the jetty access has been enlarged.

In the new plant, the grain is handled under cover right from the silo into the ship's hold, and even on the loading tower; the mobile belt conveyors and the inlet into the telescopic tube are fully covered with galvanised hoods which are easily accessible. It is thus possible to continue grain handling in all weather conditions, an advantage on this coast where sudden rainfalls and squalls are a frequent occurrence. In bad weather, only the hatch around the telescopic tube need be covered with tarpaulins. A wind measuring device has been installed to give warning when the wind has reached an intensity of 5 and to give a main alarm at wind intensity 6. As a precaution, the upper and lower travelling beams of the loading tower are locked to the travelling rails, to prevent it

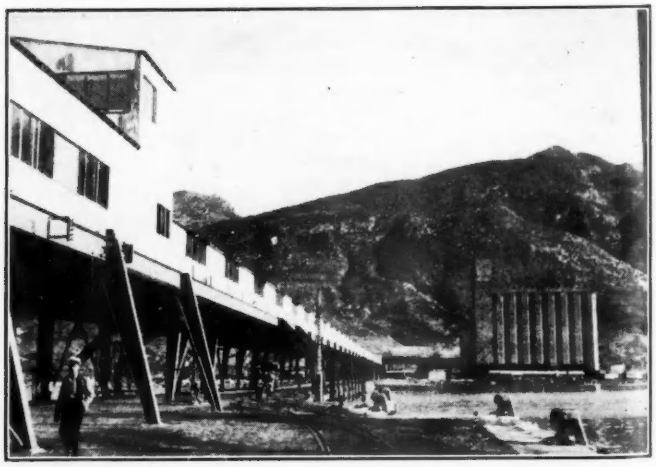


Fig. 6. View of control stand, conveyor and grain silo.

Handling Plant at Iskenderun, Turkey—continued

from drifting off or tipping over if the gale should increase still further. The telescopic tube is also firmly secured to the ship if the loading is continued during storms.

Control of the Plant.

The entire grain handling plant is controlled from three points: one switchboard in the silo building, one control station on the jetty head and a cabin on the mobile loading tower. Each of these is manned by one operator, and all three are in optical and acoustical communication by pilot lamps, illuminated diagrams and telephones.

The process of handling the grain is carried out in the following manner. The loading tower (Fig. 8) which is controlled by the operator from his panoramic sight cabin is brought into position in front of the hold to be loaded. The tower's conveyor jib carrying the telescopic tube is then placed into position by means of a simple reversing switch, and a short mobile conveyor is projected through the rear of the tower and passed into the belt bridge through a sliding door. Here it is coupled to the discarding carriage attached to the long belt conveyor. The tower conveyors are then started and this is shown on the illuminated diagram on the central control desk. The loading tower operator also signifies his readiness for operation by telephone.

In the central control station the belt conveyors are switched on by means of push buttons on the control desk which actuate oil contactors. Before these conveyors actually start running, however, a time relay switches on a chain of warning horns along the entire system in order to give warning of the commencement of the operation. Push buttons are placed beside the pilot lamps for the various conveyors. When the illuminated diagrams light up on the switchboard in the silo, the system is ready for the grain to be discharged from its respective bin. The pilot diagrams in the silo are connected in parallel to those on the central control desk.

Every precaution has been taken and safety devices installed to preclude faulty service, interruption or damage to the plant. The conveyors are interlocked electrically according to their functions, thus making it impossible that there should be a faulty succession of the various operations. Automatic interlocking switches and electric limiters prevent other mistakes being made, for instance in moving the jib, or in operating the travelling gears of the tower and the discarding carriage. Should a belt slip or slant due to human or technical fault, automatic guards give warning signals. If these signals are not switched off, the entire handling system is automatically stopped, thus preventing any heavy damage. Emergency push buttons on the belt reversing points and at regular intervals along the whole length of the conveyor operate an immediate emergency stop of any of the sections of the plant. When this happens, all preceding conveyors are automatically switched off so that there is no pile-up of material along the belt. At the same time, every pilot lamp for the stopped conveyors goes out on the control desk.

Fig. 7. Seaward view from control stand to conveyor bridge.

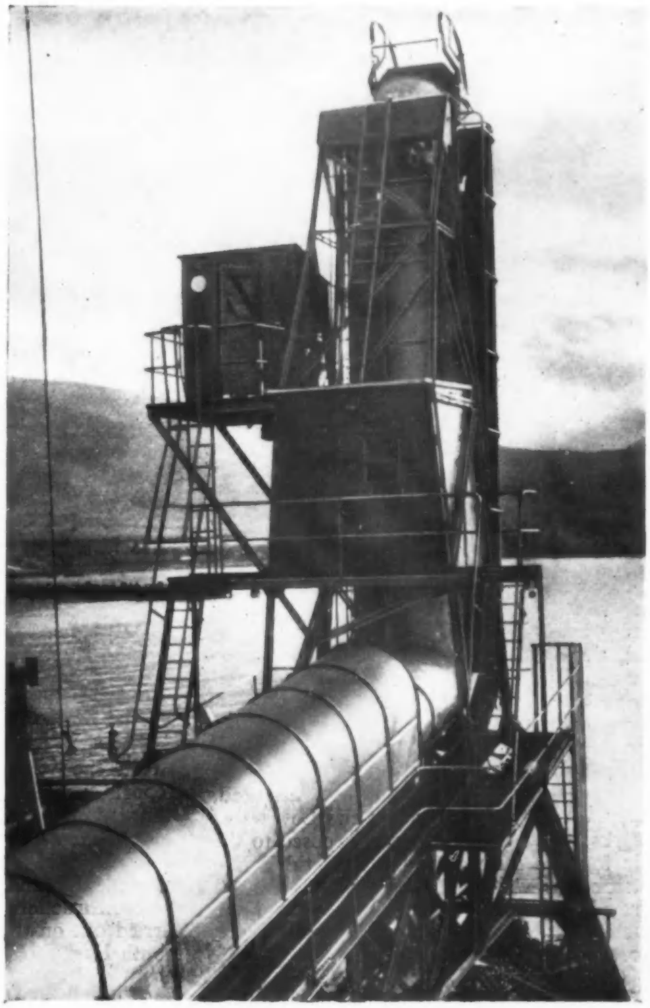


Fig. 8. View of loading tower.

The number of personnel required to run the plant is small. Apart from the three men needed to operate the control points, one man only is required between silo and loading point for watching the smooth running of the belts, and to occasionally shift the discarding carriage from one sliding door to another.

The German firms who were given the contract to supply and erect the new plant had also to guarantee the plant for one year and to lend experienced operators to train the Turkish personnel.

It is expected that the bulk handling installations for ore and coal will be completed and put into service in the near future.

Waste Oil Disposal at Swedish Ports

Plans are in operation at two Swedish ports for the provision of facilities for the reception of oil residues as prescribed in the International Convention for the Prevention of Pollution of the Sea by Oil. At Stockholm, a settling tank with a capacity of 500 cubic metres is to be constructed near the Loudden oil harbour to receive waste oil from all coastal tankers which load there. This tank is to be regarded as an experimental installation, and will be placed at the disposal of the six oil firms which maintain depots at Loudden on the basis that they will bear the cost of operation. Oil extracted from ballast water will be burnt.

At Helsingborg it is proposed to provide a tank of 400 cubic metres capacity and a cleaning basin and it is hoped that the plant will be ready for use by the end of the year.

The Use of Timber in the Construction of Sea Defence and River Works*

By K. E. COTTON, M.B.E., M.I.Mun.E., M.R.San.I., M.Inst.H.E.
(Chief Engineer, East Suffolk and Norfolk River Board).

(Concluded from page 127)

It may be helpful here to make specific reference to some of the works with which I have been connected, and to comment on any special features.

(1) Aldeburgh Sea Defences—Groyne System.

The groynes in this system were commenced early in 1948 and completed by the end of the year. All timber used on this scheme was Merchantable Quality British Columbian Pine—Untreated.

In the early part of 1950 it was noticed that a lot of the planking had been badly attacked by Teredo beetle.

Figs. 18 and 19 show close up views of the 9-in. x 3-in. planking in situ on the groynes. At first inspection the king piles did not seem to be affected. When some of the planking was stripped off the groynes it was found that the borer had attacked the king piles where the planking had faced onto them. The main attack seemed to be concentrated on the Northerly section of the system. On the individual groynes only the Seaward end of the groyne was attacked, approximately between High and Low water marks, where the timber was exposed to the air for a certain period of the tide. No attack was visible on the southerly-most 7 groynes. This was probably due to the fact that the majority of the groynes were pretty well covered with beach.

One point worthy of note was that some of the timber in inspection did not seem to be affected apart from a few minute pin prick holes on the outside, but when the timber was cut into, the cross section revealed a series of holes, anything up to ⅛-in. in diameter. These holes were all lined with a white shell-like deposit, which was rather brittle.

The affected planking was replaced with freshly sawn English Elm chemically treated under pressure.

The 1953 surge caused severe scour on this length of beach. Fig. 20 shows conditions existing shortly after the shingle ridge had been partially restored by bulldozing and much of the top planking of the groynes removed pending the building up of the beach again.

(2) Kessingland, Suffolk—Sea Defences.

In 1947 timber groynes were constructed of untreated Douglas Fir, the type of construction being very similar to those in (1) above. By 1949 the timbers between high and low water mark were similarly affected.

(3) Lowestoft, Suffolk—Sea Defences.

In 1902-4 timber groynes were erected on the North and South beaches. The main timbers were 10-in. x 10-in. pitch pine and were not treated in any way. In 1912 the groynes on the south beach failed and partial reconstruction became necessary. The trouble was found to be chiefly caused by Teredo and Limnoria.

The main and sheet piles were renewed but the struts and walings which were thought to be sound were re-used. In 1917, however, the pitch pine put in in 1912 was absolutely destroyed and the view was held that the new timbers had been put down in close proximity to the old timbers, which were then found to be badly infected by worm.

The groynes on the North Beach erected in 1902 lasted till 1914 when it was found that failure was due to abrasion by shingle and not worm action. It was thought that these North groynes were immune from worm action due to the constant bombardment of shingle which prevented the larvae from attaching themselves to the surface of the timber.

(4) Great Yarmouth Harbour.

Reference to the Consulting Engineer's Report in 1882 shows that much of the piling must have been driven shortly after that date. Figs. 21 and 22 show the piling in 1951. Note the condition of the piling between high and low water mark.

Reconstruction work has recently been carried out on the piers and quays of Yarmouth Harbour. Some timber sheet piling, mostly creosoted Memmel was withdrawn and when cut up was in excellent condition. This timber is known to have been driven about 70 years ago.

On the South Pier stumps of old round piles were withdrawn when driving new portions of the quayhead. These were mostly oak piles protected by "scupper nailing" between high and low water mark. Scupper nailing consists of large flat-headed nails driven with heads touching one another (see Fig. 23) and served to protect the timber from marine insect attack.

On the East quay Pitch Pine piles which were withdrawn after 25 years were badly ravaged with Teredo (see Fig. 24).

Fig. 25 illustrates another pile withdrawn from the same area from which it appears that straightness of pile was not always insisted upon. It is thought that this timber is at least 80 years old.

(5) Horsey, Norfolk—Sea Defences.

In February, 1938, the sea broke through at Horsey and in conjunction with the new sea wall a system of 17 groynes was erected. These were constructed in Columbian Pine and the timber was creosoted under pressure. Fig. 26 shows one of these groynes immediately following the 1953 surge. Although the bagged concrete wall suffered severe damage (see background of photograph) the groyne was undamaged. I can find no sign of marine insect attack on these groynes and there is remarkably little wear due to abrasion of sand and shingle. Since 1953 the height of the groynes has been increased by the addition of two 9-in. horizontal planks of Columbian Pine chemically treated under pressure.

(6) Horsey, Palling, Waxham—Sea Defences.

After the 1953 floods a further 23 timber groynes have been erected on this stretch of coast. Timber used is Columbian Pine for 16 groynes and Greenheart for 7 groynes. The Pine was incised and treated with chemical wood preservative under pressure. The Greenheart was untreated but all cut ends were immediately painted with 2 coats of tar.

The groynes have not been erected for a sufficient length of time to give any indication of the success of preservation treatment, but so far I have been unable to detect any damage by marine worm.

Advantages and Disadvantages of Timber for River Board Works.

Based on experience, my views as to the us of timber in River Board Works can be summarised as follows:—

Advantages

(a) Easy to handle and work.
(b) Structure can be easily adjusted—this is particularly important on groyne work where the top profile has to be adjusted to suit changes in beach conditions.
(c) Timber piling in rivers when damaged by shipping can be more easily repaired and pieced into existing work. Damaged steel piling or concrete work usually requires complete reconstruction. Fig. 27 illustrates the typical type of damage caused by shipping.
(d) Cheaper than steel or concrete.
(e) Where beach material is not unduly large, timber withstands abrasion better than concrete structures.
(f) Labour skilled in the handling and working of timber is usually available. This is not always the case when working in steel or reinforced concrete.
(g) Due to the nature of the work and the frequent encounters with unforeseen obstructions it is not always possible to erect marine structures to a great degree of accuracy. Any necessary variations can readily be made on site when timber is being

* Paper read at the Annual Convention 1956, of the British Wood Preserving Association.

Use of Timber in Defence Works—continued

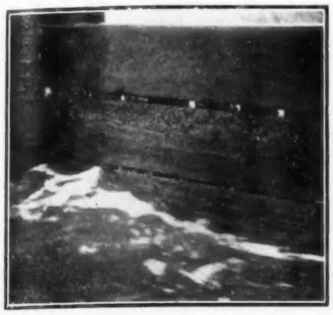


Fig. 18.

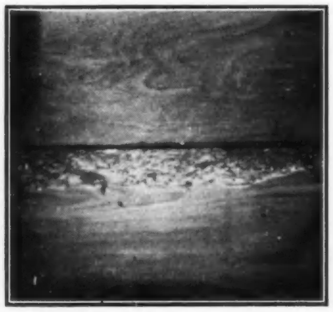


Fig. 19.

Fig. 20.

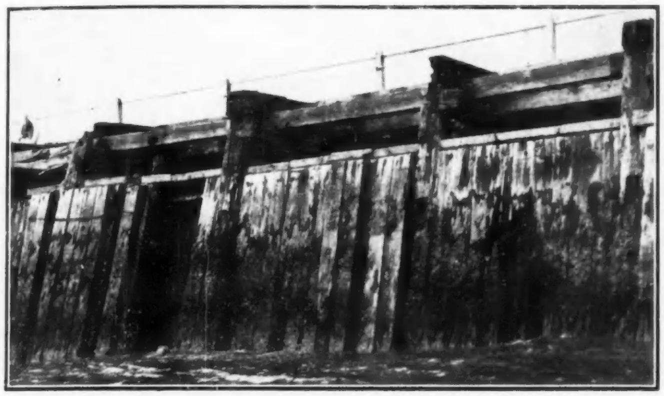


Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25.

used, whereas in other forms of construction such as steel, modifications very often mean the scrapping of units of a different design.

Disadvantages

(a) Susceptibility to marine insect attack, although this has been largely overcome by the various methods of preservation treatment.

(b) Occasionally there appears to be some additional expense involved by extra cost of haulage and handling by reason of the timber having to be sent to treatment works.

(c) Difficulty of ensuring that all faces cut on the job are suitably treated.

(d) In tidal waters timber piling which is "wet and dry" has a comparatively short life. 3-in. x 9-in. Columbian Pine piling recently withdrawn on the River Bure at Horning is absolutely sound except for the top 3-ft. This piling has been driven at least 25 years.

(e) On about three occasions in my experience "pack ice" has moved up and down tidal rivers and literally cut the timber piling at ice level.

(f) Difficulty of driving sheet piles in hard strata to ensure close butt joints. In this respect it would be interesting to know if any form of inter-locking or rebated edges are practicable.

Comments Regarding Timbers Used

It will be seen from the various jobs already described that use has been made of Columbian Pine, Pitch Pine, Greenheart, Krabak, Gurjun, Elm and Alder.

Columbian Pine.

Untreated, this timber is highly prone to attack by marine borers. Treated, the tim-

Use of Timber in Defence Works—continued

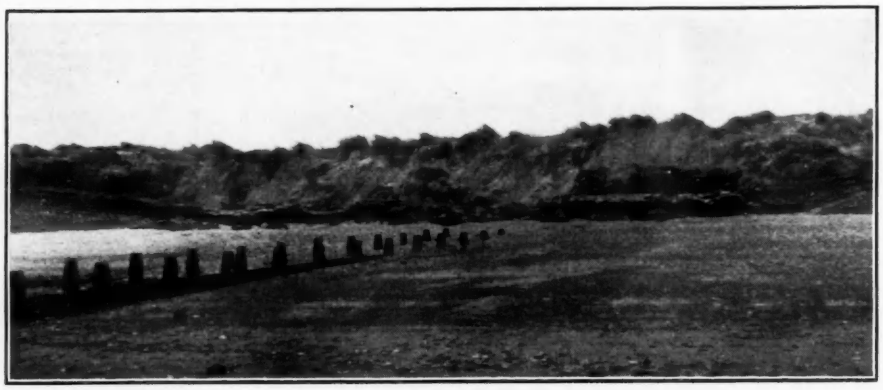


Fig. 26.

ber appears to be immune and its life greatly increased.

It offers little resistance to abrasion. Fig. 28 illustrates the effect of shingle spilling over a pine groyne at Cromer.

Where hard driving was encountered this timber had a tendency to split.

Pitch Pine.

Untreated timber has been known to be completely riddled by Teredo in five years.

Because of its strength this timber has been found eminently suitable for piling likely to suffer heavy blows from shipping.

Greenheart.

No evidence has been found of this timber being attacked by marine insects. The timber is well known for its durability and resistance to abrasion. The use of timber from young trees should be avoided as the sap wood in this timber does not contain the same high percentage of valuable properties present in the more mature timber.

Because of its tendency to split, great care is necessary in seasoning, working and handling. Cracks usually develop near the ends of the timber but do not extend far down. Until required for use the timber must be kept stacked on an even bed and kept covered from the weather or totally immersed.

Heart rot has been found in a few 9-in. x 9-in. members. This was detected when boring for bolt holes, otherwise this might have been passed undetected.

In considering the timber sizes for Greenheart groynes, it was found that 6-in. x 9-in. was a bad section in this timber, as it was "off centre" resulting in bowing in its length. 9-in. x 9-in. or 8-in. is a good section and provides a good "boxed heart" section. I did have some trouble with 9-in. x 6-in., 9-in. x 3-in., and 12-in. x 4-in. timbers due to bowing and split edges, and a few measurements of bowing recorded on site are given below.

Section	Length	Horizontal bow with timber	
		On Edge	Set flat
9-in. x 9-in.	20-ft. 6-in.	½-in.	½-in.
9-in. x 6-in.	23-ft. 6-in.	2-in.	⅞-in.
12-in. x 4-in.	23-ft. 6-in.	4-in.	½-in.
9-in. x 3-in.	13-ft. 6-in.	2½-in.	½-in.

It would be interesting to know whether any cheap means of straightening these timbers is known. It will be appreciated that where timbers such as the 9-in. x 3-in. are to be driven tight up to one another, a bow of 2½-in. in a 13-ft. 6-in. length is not acceptable and such timber has to be rejected.

Jarrah, Gurjun and Krabak.

Jarrah has been found to be highly resistant to marine insect attack. Gurjun and Krabak have proved successful for river piling and show no sign of rot in tidal waters after 16 years.

Elm

Elm after two years in salt water shows no sign of attack. Where the driving was hard this timber was found unsuitable due to the tendency to split.

Alder.

This timber is particularly durable where continuously under water and being in good supply locally is used extensively where great strength is not required.

Marine Organisms

Having briefly described the various uses to which timber has been put on the East Coast, a few comments on marine organisms may be useful.

Limnoria and Teredo appear to have increased in this area since about 1930. It would appear that where the sea action is heavy and rubbing with shingle and sand is fairly constant, the worms seem to have greater difficulty in obtaining a hold and damage is comparatively small.

Experience shows that damage by worm progressively reduces as we travel northwards. The most northerly attack I have found is at the seaward end of a Columbian Pine (untreated) groyne at Cromer. Here the piles and planking are almost completely riddled through by Limnoria (see Fig. 29).

It has been noticed that where the temperature of the sea or river has been raised by cooling water from some installation, the position is worsened. It is also worthy of note that in the vicinity of sewer outfalls there is a marked diminution in the ravages of marine worms.

The activities of Limnoria and Teredo appear to depend largely upon the density of the water and consequently on the percentage of salt present. Teredo will not flourish in brackish water, nor in sea water much diluted with fresh water. It confines its ravages from about half tide level down to sea bottom. Below normal beach level timber is invariably found to be sound.

When wholly immersed, timber suffers little from the action of salt water beyond perhaps a slight weakening due to the softening of the fibres. It may be seriously damaged through abrasion by shingle set in motion by wave action and tidal currents; it can be totally destroyed by marine organisms. Exposed ends of timber especially near low water level are especially

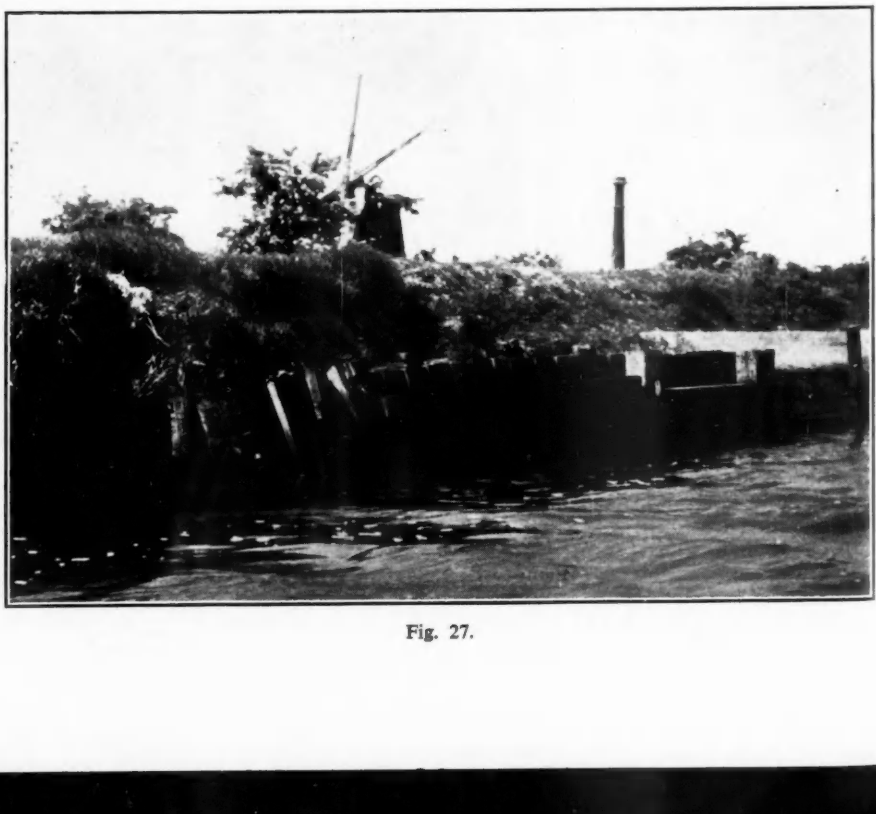


Fig. 27.

Use of Timber in Defence Works—continued

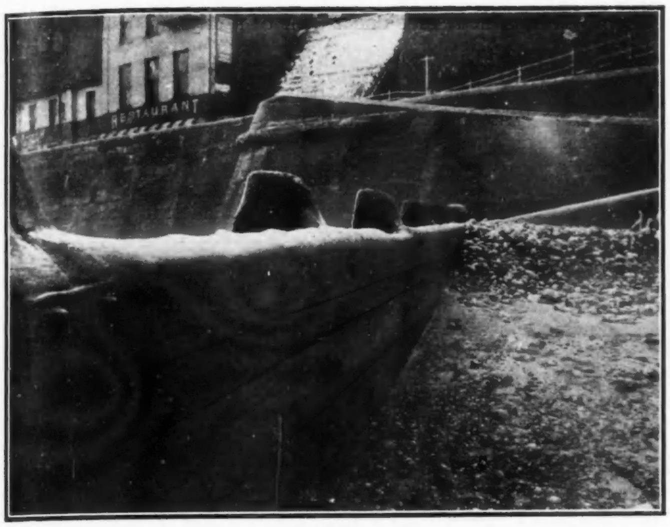


Fig. 28.

Fig. 29.

liable to attack. Bolted joints between timbers, such as the junction of walings and piles, are found to be highly vulnerable points.

The foregoing descriptions will I hope indicate to some extent the varieties of use made of timber in carrying out River Board works.

The increase in the cost of timber in the last twenty years makes it necessary to ensure that its life and usefulness is extended to a maximum. I have by me the tenders for Douglas Fir used on the River Yare for tidal piling in 1936. The figures for timber delivered, incised and creosoted were:—

9-in. x 9-in.	24-ft. 0-in.	4s. 5d. per cu. ft.
9-in. x 6-in.	20-ft. 0-in.	4s. 9d. per cu. ft.
9-in. x 3-in.	18-ft. 0-in.	4s. 0d. per cu. ft.

Present-day prices for similar timber would average 17s. per cu. ft. Incidentally this piling is still in first class condition after twenty years, although at some points it has had to be replaced where damaged by shipping.

With such an alarming increase it is obvious that the period of life of timber marine and river structures must be extended to the full and it is in this field that the use of preservatives is fully justified.

I can quote cases of groynes constructed of timber and where very little maintenance has been required in 25 years; I can also quote cases where steel railway metal piles have been badly worn by the rub of the shingle and need replacement after much less than 25 years.

In conclusion I would like to say that in my opinion the use of timber on Sea Defence Works and River Works has stood the test of time and its continued extensive use is assured.

Freedom for Shipping Services

O.E.E.C. Report on Flag Discrimination and Other Problems

(Specially Contributed)

A year ago the Maritime Transport Committee of the Organisation for European Economic Co-operation (O.E.E.C.) published a first report on the economic situation in maritime transport. The main theme was that any governmental interference with the free circulation of shipping in international trade tends to reduce the efficiency of the total available tonnage and hence to increase the cost of shipping services and, therefore, that the O.E.E.C. countries must continue their resolute opposition to action by governments leading either to flag discrimination or to other restrictive shipping practices.

A second report has now been issued, following a layout similar to the first, and dealing with developments in maritime transport during 1955. The functions of the Maritime Transport Committee, as set out in the report, are worth noting. In the general framework of European co-operation, it is stated, the committee constitutes a forum for discussion of all shipping problems not only between the participating countries but also in relation to other countries. It is the only international governmental body in the overall maritime field which meets regularly. By the very fact that shipping is so completely an international service, the committee finds that its functions inevitably extend beyond the O.E.E.C. sphere.

It has to take account of all restrictive shipping practices wherever these occur throughout the world and it advises the council, in all appropriate cases, of action which might suitably be taken by the O.E.E.C governments to combat these practices. It has, it is admitted, many frustrations: and indeed it is always easier to evaluate failure than success. Nevertheless the committee firmly believes that both in positive achievement and in preventing the further spread of discriminatory practices it is performing an essential task.

Amongst its other functions, the committee keeps in close touch with the European Productivity Agency in order to initiate or encourage any steps that might be taken within the framework of the Organisation to increase productivity in shipping or shipbuilding. It is also following with interest the work of the competent body in the O.E.E.C. set up to study methods of co-operation in the peaceful use of nuclear energy in view of its certain application in the future to the propulsion of merchant ships.

The committee, at its regular meetings, continues to take any necessary action with regard to the implementation of the relevant section of the Economic Co-operation Act on which it submits a monthly report to the International Co-operation Administration at Washington showing the participation of United States flag vessels in the carriage of I.C.A.-financed cargoes.

Next, it will be convenient to record the committee's conclusions. After stating that those reached in the first annual report are equally valid to-day, the committee says: "Shipping is perhaps the most international of all industries and as such can only flourish in conditions of complete freedom. To safeguard the health of their shipping industries governments of maritime countries must therefore strive to secure the elimination of any conditions or practices which mitigate against this freedom. Unfortunately throughout the world much flag discrimination still remains, although valuable progress towards complete freedom has been made by O.E.E.C. countries, among which a wide measure of liberation in shipping matters already exists.

Freedom for Shipping Services—continued

"A trend which is causing grave concern is the registration of vessels under so-called 'flags of convenience.' This is, of course, quite a different problem from that of flag discrimination. The latter practice stands condemned because interference by governments with the free competition of shipping services in international trade is inimical to the interests of all trading nations whether maritime or not. On the other hand resort to flags of convenience is not directly instigated by governments, though their actions, particularly in the field of taxation, may indirectly create conditions in which the practice presents attractions to shipowners.

"How far these attractions are real and permanent may be open to question, but there is no doubt that they can easily bring about conditions which sooner or later may provoke counter-measures. Whether there are already grounds of action by governments and, if so, what lines such action should take or whether the remedy lies in the shipowners' own hands are matters requiring the most careful study and the committee is glad to know that they are at present under consideration in several countries. The committee is not in a position at present to make any recommendations on the subject but is continuing to give the matter close attention.

"Another field where governments should give all the help they can is in regard to the excessive delays to ships in ports arising from the various causes enumerated (in the report). A review of the efforts by member countries to deal with this problem is being made by the committee and a supplementary report is being prepared on the subject in which any necessary recommendations will be made as to further action which could usefully be taken by the O.E.E.C."

Flags of Convenience.

Turning now to the body of the report, the section dealing with the registration of ships under flags of convenience points out that during 1955 ships registered under the Liberian flag have increased in tonnage by 1.3 million tons to a total of over 4.5 million tons, and from the point of view of registration only, the Liberian fleet is now the fourth largest in the world. It is also the newest, almost half the fleet being under ten years old. In addition to this, more than 500,000 tons of vessels now under construction in the world are destined for Liberian registry.

The earnings of ships registered under these flags are not subject to taxation in the country of registration. Registration is quite open to owners of any nationality without qualification, so far as concerns the country of registration, although nationals of other countries may, of course, be prohibited by the laws of their own country from registering under flags of convenience. Consequently the ships under these flags are owned almost exclusively by shipowners of other nations.

Registration of ships in any of these countries involves merely the payment of a nominal fee. The only subsequent charge is a few cents per ton annually. For example, registration under Liberian flag costs $1.20 per ton net and thereafter an annual tonnage tax of 10 cents per ton is levied with a guarantee that such tax will not be increased for 20 years.

In Panama registration costs $1 per ton and, as in the case of Liberia, there in an annual tax of 10 cents a ton. In Honduras and Costa Rica the charges are similar. At the same time it must be pointed out that these fees represent a substantial contribution to the relatively small economy of these countries. There are not in these countries the same legal obligations in respect of social security or pension schemes that apply in the case of traditional maritime countries.

However, of the reasons accounting for the development of merchant fleets under the Panamanian and Liberian flags, the most important is undoubtedly, that no matter how much, or for that matter how little, profit is earned by Panamanian or Liberian merchant ships, the only charges they have to meet are trifling. There is no doubt that under favourable trading conditions this enables owners to set aside much larger sums towards the replacement of their tonnage than other owners. Moreover, because of the opportunity they have of accumulating reserves, they are in a much better position to continue trading in times of depression. They are also in a position to build new tonnage out of their untaxed profits with far less regard to the current level of shipbuilding prices than those owners who run their ships under their own flags.

Flag Discrimination.

The report devotes considerable space to the subject of flag discrimination. The committee's activities, it is stated, are based on the principal of unrestricted circulation of shipping in international trade, irrespective of flag, in free and fair competition. They believe that flag discrimination arising from any governmental interference with this principle impairs the efficiency of shipping services and consequently leads to increased freight costs thus affecting the economy of all countries whether maritime or not.

Flag discrimination is more easily recognised than given a comprehensive description. It comprises above all any action by governments which restricts the freedom of traders to choose the ships in which cargo may be carried and thus places impediments in the path of the free flow of international trade. Examples are: cargo preference laws; measures in the field of exchange control; preferential shipping clauses in trade agreements; the operation of import and export licensing systems so as to influence the flag of the carrying ship; port regulations; taxation measures.

Flag discrimination, the report urges, has a boomerang effect on those who practice it. If maritime countries cannot sell their shipping services freely on a competitive basis, their ability to buy abroad is diminished. The result is therefore that those who prevent free and fair competition in shipping are themselves the sufferers in two ways—first, because the market for their own goods is reduced and secondly because the all-round increases in shipping freight rates, which inevitably result from discriminatory practices, raise the cost of their own exports and imports.

The economies of the other countries, maritime and non-maritime alike, are similarly affected because the increased transportation costs brought about by flag discrimination are reflected in the cost of their imports and exports. Thus the non-maritime countries also have a great interest in preserving the principle of freedom of shipping services.

Turn-round of Shipping.

Finally, on the problem of the slow turn-round of shipping in ports, the report points out that delay is a costly item and frequently offsets the advantage of increased speed provided by modern marine machinery. The result of slow turn-round is increased transport costs, which in due course are reflected in the price the consumer pays for food and commodities.

Slow turn-round, it is stated, is due to two main factors: inefficient port facilities and labour difficulties. This is a question which preoccupies shipowners and port authorities throughout the world. Clearly in their building and modernisation programmes ports must provide facilities which will be adequate for the changing pattern of trade, or ship design, and of mechanical development. Continual efforts must be made to solve labour problems as they arise. Government policy should aim at ensuring complete freedom from restrictive practices in ports. It is difficult, the report comments, to forecast a future governed by so many imponderable factors, but the authorities and shipowners in most countries are co-operating closely to ensure the fulfilment of their common interests.

The report recalls that in August, 1951, the council of the O.E.E.C., on the submission of the Maritime Transport Committee. recommended member governments to take all possible steps to improve the turn-round of shipping in the ports within their territories as a means of ensuring increased carrying capacity of world shipping and the more efficient use of ships. In many countries steps have been taken by governments to alleviate the position. Ports have been modernised, efforts made to organise and educate labour to a higher state of efficiency, and communications to and from ports have been improved. In other countries, the situation over the past few years has shown no improvement and in some cases has deteriorated. The Maritime Transport Committee is continuing to study this problem with a view to deciding what further action could be taken by the Organisation. A supplement to the report will in due course be produced on the subject.

Litigation in the Port Industry

Some Recent Legal Decisions

By LAURENCE WEBLEY, LL.B.

Within the last few months, the Courts have been asked to consider such diverse matters as the drowning of a dock labourer and the relevant safety regulations, the responsibility of lockmasters and ships' masters for handling vessels in a lock, and the docks regulations for lighting while cargo is being discharged.

Accident at Tilbury Docks

Hayward, a man of 57, was drowned by falling into the dock at Tilbury in December, 1952. His widow brought an action against the Port of London Authority which has now, June, 1956, been finally decided by the House of Lords; "Hayward v. P.L.A." The facts were that the deceased was working on a wide quay loading ships stores on to trucks. The s.s. "Oronsay" was berthed alongside the quay. The weather was very foggy but there were lights on the shed wall and in the ship. The deceased was found drowned having, apparently, fallen between a quay-side ladder and a floating pontoon, used to keep the ship's side from the quay wall, which were 50-ft. apart. He was not heard to call for help. The safety regulation, applicable, which was invoked by the widow plaintiff, was Regulation 2 of the Docks Regulations, 1934: "provision for the rescue from drowning of persons employed shall . . . include:—

(b) Means at or near the surface of the water at reasonable intervals for enabling a person . . . to support himself, which shall be reasonably adequate, having regard to all the circumstances."

The House of Lords decided that, on the special facts of the case, the Authority was not liable because the deceased could not have been more than 25-ft. from the pontoon or the ladder and there was, accordingly, no inadequacy of supports. But their Lordships observed it was a pity the regulations were so vague and general. The difficulty was what intervals were reasonable for a non-swimmer. It was hard to think of any intervals which could be. The deceased was an elderly man who had not swum since boyhood. If the only means of support had been ladders at, say, 300-ft. intervals that would not have been reasonable since such a man could not be expected to swim 50 yards. The evidence showed that in modern docks the distance between ladders had been reduced to 200-ft. and, in some cases, there were vertical chains between them. The regulations did not envisage continuous means of support.

These observations by the House of Lords show that in such cases which may involve Dock Authorities in very heavy compensation claims the Courts will have regard to the nature of the victim, and the circumstances of his fall. Obviously, his distance from some support will be an important factor, and continuous support would seem the most effective answer in so far as anything can be effective for non-swimmers. The Courts may well be ready to construe these regulations very strictly against Dock Authorities unless it can be clearly shown that they have taken all possible, practical measures to comply with their vague requirements.

Handling Vessels at Grangemouth

Passing from docks to locks, most readers are, doubtless, aware that there is a lock at the entrance to Grangemouth docks. Probably, this lock is often working under pressure to try to accommodate the traffic and this may have been a contributory factor to the accident which took place there in 1951 and has, now, been decided by the Scottish Court of Session; "Cairn Line of Steamships Ltd. v. Docks and Inland Waterways Executive and Grangemouth and Forth Towing Company Ltd." The lock is 626-ft. long and 80-ft. wide. At about 11 p.m. on 19th January, 1951, the plaintiffs' steel screw steamship, "Cairnavon," of 6,333 tons gross register, 407-ft. long, beam 54-ft. 7-in., depth 33-ft. 2-in., entered the lock, bound for Halifax, Nova Scotia. She was then drawing about 20-ft. forward and 25-ft. aft. Her forward tug entered the lock with her and moored clear ahead on the west side while the "Cairnavon," herself, made fast, starboard side, to the east side of the lock. While the two vessels were in this position, two tugs, "Dundas" and "Kerse" also came into the lock from the inner end. The beam of the "Kerse," including the belting with which she was fitted, was about 25-ft. 4-in. and her length 105-ft. The "Kerse" came alongside the "Cairnavon," her funnel being abreast of the "Cairnavon's" mainmast, and made fast to the west side of the lock. Her consort, the "Dundas" moored immediately astern. The rubber tyres on the sides of the "Kerse" were touching the port side of the "Cairnavon," which had no fenders out, and the side of the lock. The lockmaster asked the master of the "Kerse" if he was "all right," to which the answer was "yes." The lock then began to empty and, not surprisingly, after some 4-ft. of water had been let out, the "Kerse" started to list to starboard and the two vessels jammed together. The lock was, at once, re-filled but they were only separated when the "Dundas" pulled the "Kerse" astern. The "Cairnavon's" plating and frames on her port side, above and below the 'tween deck level, were damaged and her owners claimed compensation. After the accident, the "Kerse" moored astern of her former position, the "Dundas" taking up a position at an angle astern of her, and across the inner gates. The vessels were then able to leave the lock safely after the water had again been lowered. The lockmaster had asked and been told the beam of the "Cairnavon."

Their Lordships said the two vessels were, certainly, not riding free, a phrase which had been used by the master of the "Kerse," in the sense that they were not touching each other. The operation involved a tight fit. There was an element of hurry that night as, besides getting vessels out during the high tide, the steamship "Baron Napier" was waiting outside for the "Kerse" and "Dundas" to bring her in. Evidence had been given by the pursuers, the plaintiffs, that if the "Kerse" and "Cairnavon" were too tightly packed in the lock the lowering water level would involve the larger vessel causing the smaller to list and when she was prevented she would ride up the side of the "Cairnavon" as the latter settled lower. The evidence showed that some kind of clearance between the vessels was essential. The "Kerse" was moored in a dangerous position and if reasonable care had been exercised the danger should have been appreciated. The question was, who was responsible for placing the "Kerse" in that dangerous position? Her master knew the situation but took her in too far. He should have been aware of the danger. Even if he had established, as he tried to do, that he went up to his final station on the express orders of the dock gate foreman, he would still be to blame for such orders could not justify him imperilling his ship. On behalf of the lockmaster, their Lordships continued, it had been argued that his question to the tugmaster as to whether he was "all right" was sufficient precaution, and that the accident was entirely caused by the negligence of the tugmaster who was in a much better position to see the danger than the lockmaster on the quayside who had never instructed the tug to take up a position which would involve the risk of fouling the "Cairnavon." But the lockmaster decided the positions of the four vessels in the lock and he realised there was an element of danger as he said he considered it important that the "Kerse" should not go too far ahead. However, he did not wait to see the two tugs finally moored. If the lockmaster chose to pack so many vessels into the lock, he should have taken further precautions, and the question to the master of the "Kerse" was not sufficient. Accordingly, their Lordships found the tugmaster and the lockmaster equally to blame.

While the ultimate responsibility for the safety of his ship must be with the master, the Court was clearly not prepared to accept arguments involving a delegation of the responsibilities which fall on dock officials in such circumstances. Their Lordships mentioned, but refused to consider, the position if the tug master had been specifically asked if he had enough clearance and replied that he had.

Inadequate Lighting for Cargo Discharge

The last matter to be considered here was an accident case before the Court of Appeal; "Simons v. Rhodes and Sons Ltd. and Another." Simons was employed as a dock labourer by the defendant firm of stevedores. While unloading cargo from the steamship "Colonial," owned by Harrison Ltd., the second defendants, at the Huskisson Dock, Liverpool, he fell over a ringbolt or cleat just after dark on a December evening and injured himself.

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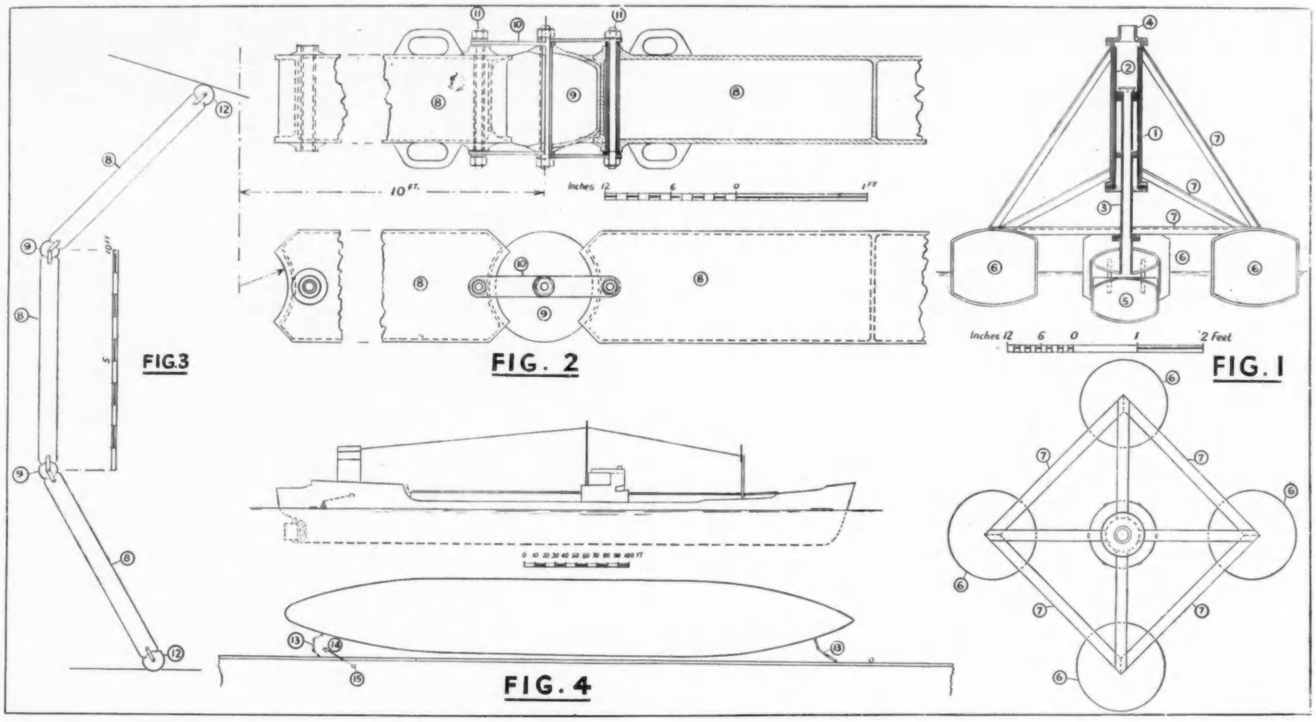


Apparatus for confining oil spillages in docks and harbours and removing the oil from the enclosed surface by a floating strum. British Patent Application No. 21300/56.

Fig. I. Floating Strum mounted on raft. (1) Strum Cylinder "Armarine" (glass reinforced plastic); (2) Liner, naval brass; (3) Sliding Suction pipe, naval brass; (4) Hose connection, naval brass; (5) Floating strum "Armarine"; (6) Floats "Armarine" or aluminium alloy; (7) Ties "Armarine" or aluminium alloy.

Fig. 11. Floating Boom. (8) Boom units "Armarine" or aluminium alloy; (9) Hinge buoys "Armarine" or aluminium alloy; (10) Links, Galvanised Steel; (11) Pins Galvanised Steel.

Figs. III and IV. Arrangement of Booms. (12) Spherical fenders, granulated cork filling; (13) Arrangement of booms for restricting spread of oil; (14) Floating strum for removing oil from the surface of water between ships and shore; (15) Portable pump.

Apparatus for Confining and Removing Oil Spillages in Docks

With the successful passage through Parliament of the Oil in Navigable Waters Bill, it was to be expected that consideration would soon be given to devising various methods of dealing with oil-contaminated water. It is the persistent oils, such as crude oil, residual oil and lubricating oil, that cause most of the pollution round the coasts of Great Britain, as well as abroad, and anything that can be done to prevent this menace should be encouraged.

The accompanying illustration shows a "Floating Strum," designed by Mr. J. M. Binmore of Mechans, Ltd., Glasgow, for the pumping of oil from the surface of the water, and its adaption for the removal of oil spillages from ships in docks and harbours.

To contain such spillages and prevent the oil from spreading over a more extensive area, an articulated boom arrangement is moored between the ship and shore at each end of the ship.

In the basin thus formed, the raft carrying the floating strum is moored at the end which may be down stream or down wind, and the strum is connected by a suction hose to a pump which may be on the quay, the ship or an attendant barge.

The buoyancy of the floating strum is arranged so that the open end of its suction is submerged about one inch.

Suction by the pump provides a flow through the sliding suction pipe which creates a lifting force on the disc attached to the upper end of the sliding pipe.

Under this lifting force the pipe and strum ascends until the lower end of the pipe reaches the surface. The flow then takes a modicum of air which reduces the lifting force and the sliding unit remains in position to skim the surface of the fluids in which the strum is floating.

The mixture of air, oil and water which is discharged by the pump, is led to some form of separator where the air content in the oil tends to give it greater buoyancy and more rapid separation.

The capacity of the pump required is from 10 to 15 tons.

For the separation of the mixture Mechans Ltd. also manufacture a separator which is of small dimensions and greatly reduces the storage capacity that would otherwise be required to take the mixture. It may be made with or without a clarifier, depending on the quality of the oil it is required to separate out.

Litigation in the Port Industry—continued

He obtained £200 net damages against the shipowners who, however, contended that Rhodes and Sons Ltd., the stevedores, were also liable. It appeared from the evidence that the lighting consisted of masthead lights and two clusters of lights for the inside of the hold. Their Lordships said that the trial judge had found as a fact that the masthead lights were insufficient. Under Regulation 12 of the Docks Regulations, 1934, when a vessel was being unloaded all places on the deck where work was being carried on and all parts of the ship to which the persons employed might have to go had to be efficiently lighted. It was clear that, on the judge's finding, the shipowners were in breach of Regulation 12. Regulation 50 accordingly came into play and provided that if the shipowners did not comply with Regulation 12 the stevedores, whose men required proper lighting, had to do so. It appeared that Regulation 50 had only once, previously, been considered in court. Attention must be paid to the last line of the regulation, "within the shortest time reasonably practicable after such failure." It appeared from the evidence that no complaint of the lighting had been made to the stevedores and, accordingly, it had been submitted there was no evidence that they ought to have known there was a breach of Regulation 12. But, said the Court of Appeal, in a case such as this, where the lighting had been inefficient for 5/6 days, the matter should have been obvious to the stevedores' foreman and his employers should have complied with Regulation 50. The liability of the stevedores was established and they were 50 per cent. to blame. To put the matter shortly, either the shipowner or the stevedores must provide proper lighting. The difficulty, of course, is that no one, as a rule, as in this case, worries about the lighting or deems it inadequate until the accident happens.

River Lee Development Scheme

Improvements to Navigation

A scheme to improve the River Lee Navigation between Enfield Lock and its junctions with the River Thames, at a cost of £864,000, has been announced by the British Transport Commission's Waterways Division. It is the largest project yet to be announced in connection with the Commission's £5½ millions Development Plan covering their principal inland waterways.

The scheme will reduce by half the time taken by the large Lee craft in navigating the locks above Old Ford; will open up the whole section Thames to Enfield (13½ miles) to the largest barges used by the carriers, thus enabling them to increase their traffics; and will provide fully modern standards of bank protection and dredging.

The River Lee, which provides London with about a sixth of the city's water supply, runs from the Thames at Bow for 28 miles to Hertford and is an important London waterway which has been navigable from earliest times. There are two entrances to the Thames, one at Bow via Bow Creek to Blackwell Point, the other oposite the Surrey Commercial Docks via the Limehouse Cut. There is also a direct connection with the Grand Union Canal via the Hertford Union (or Duckett's) Canal.

Increasing Industrial Traffic

Although the River Lee is navigable throughout its length, its substantial and increasing traffic is mainly concentrated on the heavily industrial section between the Thames and Enfield. In 1955 this 13½ mile section the volume of traffic amounted to 2,433,000 tons, nearly 350,000 tons more than in 1954. Half of this is coal for the electricity power stations at Hackney, Poplar and Brimsdown, near Enfield. Most of the traffic on the Lee is received by barges from the Pool of London, where it is transhipped from ocean-going vessels. The total handled during 1955 was 2,433,000 tons, chiefly comprising coal, liquids in bulk (petrol, tar, bitumen, oil, etc.) timber and non-ferrous metals.

All this traffic is carried by nearly 50 independent carriers who operate regularly on the waterway and who at present are building additional craft. The improvement work now to be undertaken in the section below Enfield Lock will give further scope for the growing fleets of these carriers.

The work mainly comprises:

Bank Protection	£470,000
Additional Locks	£268,000
Bridge Construction and Replacement ..	£64,000
Dredging Craft	£58,000

Bank Protection

Owing to the use of powered craft and successive dredging, much of the old stone walling now protecting the tow-path between Limehouse and Lee Bridge, Leyton, and between Stonebridge Park, Tottenham, and Angel Road, Edmonton, requires replacement. The large programme of bank protection will involve 32,000-ft. of steel piling and 3,300-ft. of mass concrete walling.

Steel piling, driven in front of the existing walls, will be used for all this work except on the highly congested and narrower reach between Limehouse and Three Mills, Bow, where mass concrete walling, which involves no restriction of the waterway, will be provided. Steel piling will also be used elsewhere along the tow-path, up to Enfield Lock, where the strong wash of tugs has eroded the timber revetments. In addition, the existing concrete walling in City Mill River, West Ham, will be repaired.

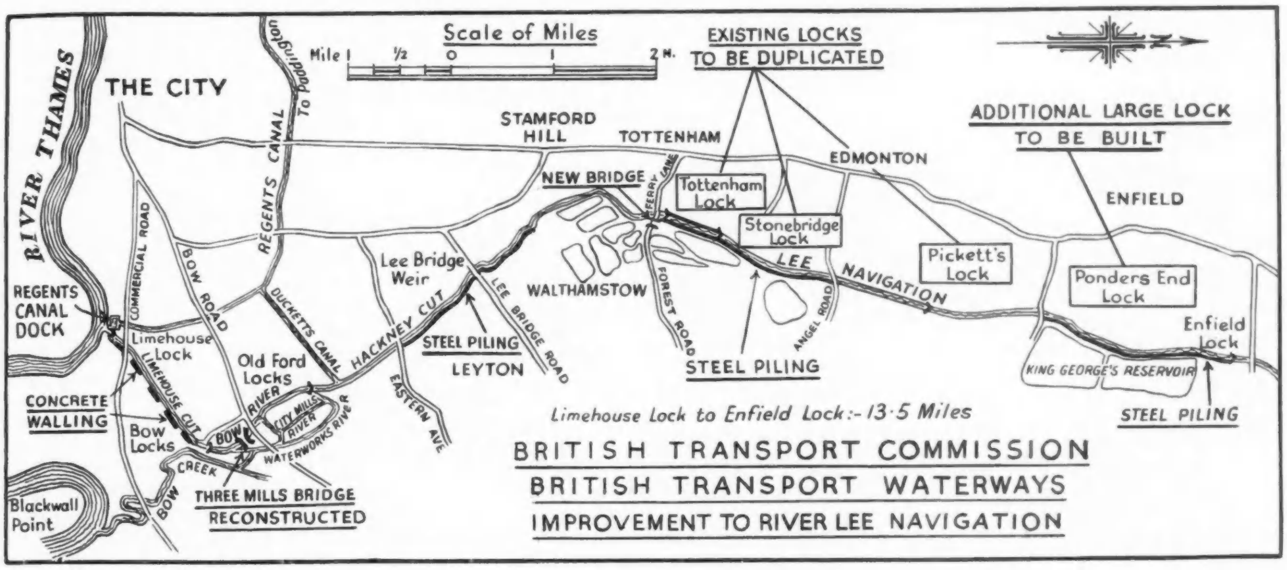
New Locks and Bridges

To avoid delays to craft at the Tottenham and Stonebridge Locks, Tottenham, and at Pickett's Lock, Edmonton, the single locks at these points are to be doubled, each new lock being large enough to take a 135-ton, 18-ft. wide Lee barge. A similar new lock to be built at Ponders End, where the existing single lock is only 16½-ft. wide, will open up this part of the waterway, which includes the electricity power station and other important industrial undertakings in the Brimsdown area, to the large Lee barges used by the lighterage companies.

The doubling of Tottenham Lock will involve the construction of a new bridge under Ferry Lane. Also, Three Mills Lane Bridge, Bow, will be reconstructed to provide a wider waterway, increased headroom and a stronger superstructure.

New Dredging Craft

The 15 wooden craft in the Lee fleet of dredging hoppers are to be replaced with modern steel hoppers, together with one additional craft, to bring the fleet up to standard strength of 28 steel barges.



Corrosion Meeting to be held in London.

Organised by the Iron and Steel Institute by arrangement with the British Iron and Steel Research Association, a meeting on corrosion problems is to be held at the Institute's London offices (4, Grosvenor Gardens, S.W.1.) on Friday, October 12. The meeting will begin at 10 a.m., the chair being taken by Dr. H. H. Burton, president of the Institute, supported by Dr. J. Pearson, assistant director of the British Iron and Steel Research Association. The meeting will be open to non-members of the Institute, who should write to the secretary at the above address for a detailed programme and a reply form enabling them to apply for reprints of the papers to be discussed.

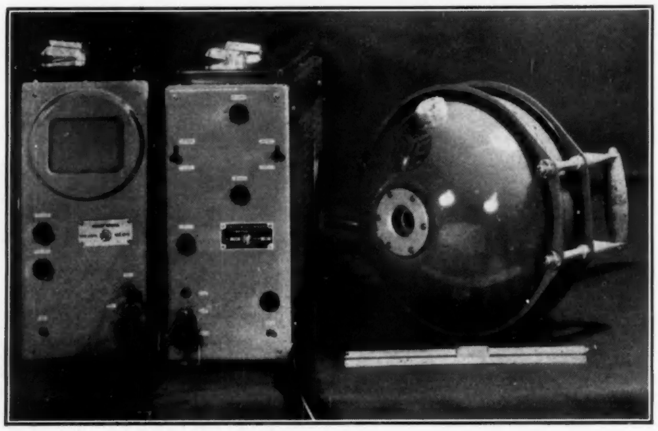
New Underwater Camera

Will Assist Salvage and Maritime Engineering

A new hand-held underwater television camera which will enable divers to be effectively supervised from above water has been produced by Pye Limited. It is claimed to be the smallest and cheapest underwater TV camera yet manufactured.

The general trend in present diving methods is to relieve the diver of as many encumbrances as possible. A free-swimming non-suited diver carrying his own self-contained breathing apparatus is able to perform underwater operations far more efficiently than the heavily-clad, slow moving conventional diver. With practically unrestricted movement a free-swimming diver is independent and necessarily cut off from the ship or quay. This method presents certain difficulties in that personnel above water are unable to tell what has happened underwater until it is related to them by the diver. Consequently, incorrect information given by the diver and mis-direction by officials may result in confusion and delay, the time lost being a particularly important factor.

With the new camera, instead of having to rely on a diver's report, a number of expert observers may view the underwater scene displayed on large-screen picture monitors. A record of the picture reproduced on the monitor screen is easily made by photographic means, which obviates the difficulty of taking photographs underwater. The equipment will find many applications in salvage operations, submarine engineering, marine biology and oceanography.



The Pye hand-held underwater television camera.

With accurate visual information available on the display monitor, it is possible for expert direction to be given to the diver and an accessory for this equipment, the underwater loudspeaker, provides a simple method. Two divers, one holding the camera and the other concentrating on a complex project, may be directed by observers above water to derive the utmost advantage from favourable weather conditions.

The camera is intended for operation down to a depth of 250-ft., but to provide an adequate safety margin the container has been designed to withstand a water pressure of 220 lbs. per square inch, corresponding to a depth of 500-ft. The unit is buoyant in water and weighs 38 lbs. in air.

Normally, the spherical camera is fitted with two handles held in position by means of two clamping rings. When not required the handles can be removed and replaced by weights or lamps so that the unit can be used without the assistance of a diver. An output socket is provided for the connection of lamps or an underwater loudspeaker.

The equipment consists of a spherical-shaped camera unit, 12-in. in diameter, and a picture monitor and camera control unit which may be on board ship or at any other convenient location above water. All camera adjustments are carried out from the control position, the only concern of the diver being to position the camera correctly.

The container for the camera unit consists of two Duralinox hemispheres held together entirely by external air or water pressure to form a sphere 12-in. in diameter. The action of forcing the two halves together by means of a simple hand tool pushes air through a release valve and creates low internal pressure.

The electronic details of the equipment are similar to those of Pye industrial television. The camera, control unit and monitor comprise a complete closed circuit television system capable of providing a high definition picture in accordance with international standards.

A Staticon pick-up tube, which has a light characteristic similar to that of the human eye, is used in the camera unit to convert the optical image to an electrical signal. Pictures displayed on the monitor are therefore extraordinarily close in monochromic detail to those of the images seen by the diver. The camera control unit is contained in a rectangular metal case incorporating all the essential requirements for the control of the signal produced by the camera. The 14-in. picture monitor is self-contained and is large enough to be viewed by a number of persons at a distance or to be used for the close examination of fine detail. Definition of the picture is very high and permits excellent photographic records to be taken. In practice it is sometimes advantageous to have separate monitors, suitable located, in order that all personnel concerned may follow the operation. The equipment has been designed with this in mind and a number of monitors may be added at will. A close-fitting waterproof cover and visor are also available as accessories to permit the monitor to be operated in the open under unfavourable weather conditions.

A larger version of this camera will be able to operate 3,000-ft. below the surface. The television camera concerned is encased in an aluminium sphere only 19-in. in diameter, weightless in water. It can be held in a diver's hand, suspended by cable from a moving ship or propelled by an electrically-operated, steerable cradle. There is, therefore, nothing to prevent the camera from being launched by a submerged submarine and operated by remote control. It can be withdrawn to a housing on the hull at the end of the operation.

The U.S. Navy has up to now bought seven of the earlier type Pye camera used for the Comet search. Ten have been purchased by Canada, three by Italy, three by Britain, two by Japan, and one each by Poland, Finland, Australia, New Zealand and Venezuela. The original is now in the Science Museum, South Kensington.

Combined Use of "Umbrella" Buildings and Soil Stabilisation

Possibilities of future utilization in Ports

The first instance in which both soil stabilisation and the "Umbrella" form of construction have been combined in a single project was recently completed at Leamington Spa. The building is destined as a new garage for the Birmingham and Midland Motor Omnibus Co. Ltd. and comprises four "Umbrella" standard units each 105-ft. x 40-ft., four "Umbrella" units 45-ft. x 40-ft., and one "Unimer" extension 105-ft. x 18-ft. 4-in. Soil stabilisation was used for the sub-foundation work for approach roads, garage floor, office block and perimeter walls.

The "Umbrella" method of construction is based on pre-engineered units consisting of a single lattice girder of tubular steel supported at each end by a single tubular steel column. The length of this girder provides an effective span of the building and is normally 75-ft., 90-ft., or 105-ft. long. From each side of the girder at 15-ft. intervals are fixed tubular steel cantilever trusses 20-ft. long.

The advantages of this type of structure include clear spans up to 105-ft. wide, free of obstruction by pillars or other supports; lighter weight and therefore lower foundation costs; lower maintenance costs and complete freedom in exterior design and interior layout; considerable savings in the cost of parapet walls; freedom to extend in any direction by the addition of further standard units; lower initial and erection costs and speedier erection because of the use of part assembled, pre-engineered units. The structure

Combined Use of "Umbrella" Buildings—continued

is particularly suitable as a garage or warehouse as it provides a wide obstruction-free floor-space. The area in this instance covers some 25,000 sq. ft. 6-in. corrugated asbestos cement sheets were used in the roofing, with translucent fibreglass reinforced plastic sheets to give even natural lighting over the whole area of the floor.

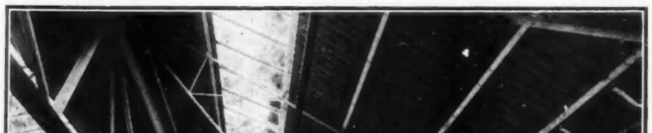
Soil Stabilisation.

Soil stabilisation may be described briefly as the mixing of cement, plus certain additives, with soil rotovated to a predetermined depth and subsequently compacted and cured. One of the first applications of the method on any scale in this country was incorporated in both roads and foundations for dwellings at Walshes Farm Estate for the Urban District Council of Stourport-on-Severn. The Consulting Engineers for the foundations were Messrs. Soil Engineering & Contracting Co. Ltd., and Mr. D. F. J. Henri, A.I.A.S., was the Quantity Surveyor, and Messrs. Richard Costain Ltd. (London), were the Contractors. Compared with traditional methods, the use of soil stabilisation showed 22 per cent. savings in costs and a 50 per cent. saving in time. The roads proved to be eminently satisfactory and have taken (and still are taking) a large amount of heavy constructional traffic, far heavier than the normal requirements for a housing estate, without showing any signs of distress. It was, therefore, reasonable to assume that a similar technique would result in big savings in both time and costs when compared with traditional forms of construction for the project under review.

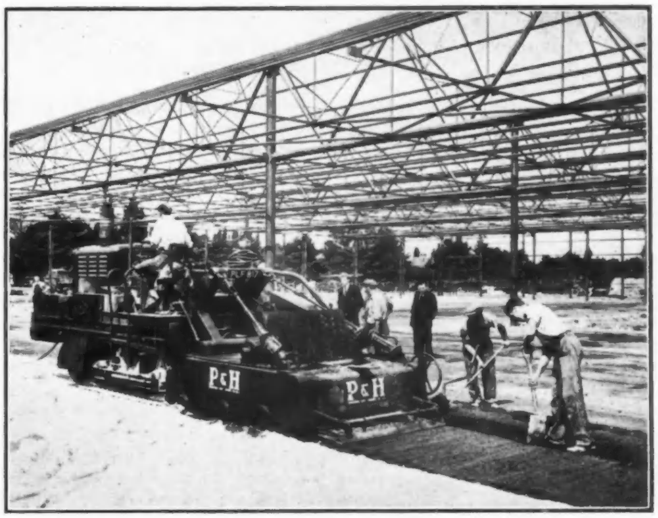
The decision to utilise soil stabilisation followed a visit by Mr. A. B. Taunt, A.I.A.A., Chief Architect to the Birmingham and Midland Motor Omnibus Co. Ltd., to the Stourport site at the invitation of Mr. D. F. J. Henri, A.I.A.S., who is the Consultant Surveyor to the Omnibus Company. Soil Engineering and Contracting Co. Ltd., were subsequently appointed Consulting Engineers for the project. Several problems had to be overcome. First was the necessity for providing a "top" which would resist both the effects of oil and grease and the heavy wear and tear which might be expected from the frequent manoeuvring of vehicles within the garage area.

After some experiment by Soil Engineering & Contracting Co. Ltd., a top mix, consisting of a 3-in. layer of a 7 : 1 mix of $\frac{3}{8}$ aggregate with sharp sand and "Pectocrete" agnated cement, proved capable of meeting the difficulties. It was also decided that roads should be surfaced with a 2-in. layer of bituminous limestone tarmacadam.

The entire area was first stripped to "profile" level and incidental work placed in position. The foundations for the main tubular supports (which carried approx. 40 per cent. less dead weight than would be required if the structure was of rolled steel sections) for the "Umbrella" girders was excavated and concreted and the complete steelwork skeleton for the building was then erected. The whole of the road and garage area was then Rotovated to a loose depth of 9-in. Certain areas were previously treated with a calcium chloride solution to destroy organic substances in the soil. Cement was then distributed at a predetermined ratio according to site conditions and subsequent loadings and rotovated, until an even texture was obtained.



Interior view of the first building ever to use standard tubular steel Umbrella construction giving a clear span of 105-ft.



Soil stabilisation in progress forming the floor of the new Bus Garage at Leamington Spa.

The area was next compacted by using a $2\frac{1}{2}$ ton smooth wheeled roller followed closely by an 8 ton tandem or three wheeled roller of equivalent weight fitted with a weight differential. Where access is difficult compaction will be achieved by using a $6\frac{1}{2}$ cwt. vibrating roller or vibrasoil compactor of the equivalent weight.

As soon as each day's processing was completed, the area was sprayed with a 55 per cent. cold bituminous emulsion, sprayed at the rate of 8/10 yds. per gall. and lightly dusted over with sand or equivalent material. The Stabilisation and construction of the approach roads followed that for the buildings.

It has been estimated that when compared with traditional methods a total saving in the order of £2,000 has resulted from the specification of soil stabilisation for this project.

For example the necessity of excavating 1,800 to 2,000 cu. yds. of soil and to provide 800 to 1,000 tons of hard core were both eliminated. In addition only 6-in. x 5-in. kerbstones as against the normal 10-in. x 5-in. were required. The savings in time and labour alone are considerable.

The "Umbrella" and "Unimer" buildings were manufactured and erected by E. H. Smith (Westhaven) Ltd., Acocks Green, Birmingham.

Port Improvements at Sundsvall.

Expansion calling for the expenditure of £2,000,000 is being carried out at Sundsvall, Sweden's second largest port on the Gulf of Bothnia. Nearly half of the money will be used to enlarge the port's system of rock cisterns for the storage of oil.

Present facilities include an ocean quay deep enough to accommodate any vessels that can enter the Baltic but the new programme also includes the deepening and reinforcing of 6,000-ft. of other quays.

Last year 2,554 ships, aggregating 1.3 mn. net register tons, were cleared in and out of the port, as against 2,156 vessels and 1.24 mn. tons in 1954.

The port is generally icebound for a period each year but with the exception of the very severe winter of 1955-56 it has not been closed for more than a month a year since 1948. There are adequate means for local icebreaking as long as the condition of the Baltic permits the movement of shipping.

Newport Docks

Improved Facilities for General Cargoes

Newport is the nearest South Wales port to the Midlands and is closer to London than any port of comparable size. Its development from a small town to a large industrial area with a population of over 100,000 is therefore not surprising. Much of the progress made has been due to the docks where there has been a steadily expanding flow of traffic and this in turn has lead to industrial expansion. During recent years there has been a considerable increase of new industries in the area and in place of coal, which, before the war, was the principal commodity handled, oil fuels and other raw materials are now imported and a wide range of finished products exported to markets throughout the world. Newport has therefore improved its port facilities to meet the demands of the new commodities now being handled.

The docks system of the port comprises the Alexandra North and Alexandra South Docks, which are connected by a junction and form, in effect, one complete area of some 125 acres of deep water. The largest cargo liners afloat can be accommodated comfortably and their docking and undocking is effected by means of a lock 1,000-ft. long by 100-ft. wide, which is also divisible into two sections of 600-ft. and 400-ft. The depth of water on the outer cill at H.W.O.S.T. is 45¼-ft. and at H.W.O.N.T. 35¼-ft.

The Alexandra South Dock is the larger of the two docks, the West and North sides being laid out for the shipment of coal, for which purpose eight modern hydraulic coal hoists are provided with lifts up to 76-ft. above water level, each capable of dealing with 20-ton wagons. Commodious sidings and feed roads to each hoist facilitate the shipment and, if necessary, the mixing of coal cargoes.

View of Alexandra South Dock, Newport, with 3,600-ft. of continuous quayage.

The Sea-lock, 1,000-ft. long and 100-ft. wide.

On the South and East sides of the dock are the general cargo quays which are 4,400-ft. in length—fully equipped with cranes, transit sheds, storage sidings, stacking grounds and other facilities for dealing with general cargo of all descriptions. The 3,600-ft. of continuous quayage on the south side of the South Dock is claimed to constitute one of the finest general cargo quays at any port in the country. The North Dock, approximately 29 acres in extent, also affords excellent facilities and is well equipped for the speedy and economical handling of cargo direct between ship and road or rail vehicles.

Parallel to the dock on the west side are two timber floats, having a total water area of 15 acres, where imported log and baulk timber may be stored. In addition, fronting the River Usk, there is a wharf 403-ft. long, equipped with three 2-ton hydraulic cranes, which is suitable for accommodating smaller types of vessels carrying bulk cargoes.

The Port is efficiently equipped for the handling of general cargo with 68 quayside electric and hydraulic cranes, ranging from 3 tons to 30 tons in capacity. A 50 ton floating crane is stationed at the docks, and a 100 ton floating crane is available for service at Newport and the other South Wales Docks when so required. The quayside sheds are adequately equipped with fork-lift trucks and other modern mechanical handling facilities, including gantry and mobile cranes. Steam travelling and mobile cranes are also available for operations such as banking of traffic, etc.

No dock system is complete without adequate dry docking facilities, and in this respect Newport is particularly well served, having five commodious dry docks available for the servicing of vessels, and major repairs are efficiently dealt with by the various ship repairing firms with works adjacent to the docks.

An important development which should prove of considerable benefit to both the town and port is the construction of a new shipbuilding yard on the west bank of the River Usk by the Atlantic Shipbuilding Company. The yard is being built on 58 acres of land leased from the British Transport Commission and is adjacent to Newport Docks. This is the first new shipyard to be built in Britain for the past 26 years and Phase 1 of the project has already been completed. This comprised the erection of a large fitting shop where prefabricated sections of ships are being made, and the construction of a dry dock in which the sections are welded into complete ships of up to 8,000 tons. Plans for Phase II of the scheme provide for the building of a much larger dry dock in which ships of up to 45,000 tons will be built.

It is interesting to observe that, in addition to three vessels already constructed for service on the Canadian Lakes, this Company has recently secured, in the face of strong German and Japanese competition, a dollar order worth the equivalent of about £2,250,000 for the construction of four cargo vessels for Cuba.

The British Transport Commission recently authorised expenditure to provide a new ring main at the port for the purpose of increasing and improving the existing single feed electricity supply. This installation will meet the increased demands made by the provision of six new electrically-operated level luffing cranes of 10 tons capacity, to facilitate the rapid handling of ore cargoes, and also the needs of the Monmouthshire Board Mills now established near the South Dock Entrance Lock. The existing steam plants for hydraulic power and impounding at the South Lock Power Station and the North End Power Station are also being replaced by the provision of electrically-driven pumps. The total cost of the new work is estimated at over £350,000.

Russian Inland Ports being Enlarged.

It is reported in the Russian press that work has started on extending four Russian inland ports—Novo Sibirsk, Gorki, Kuibyshev, and Kotlas. Wharves, warehouse and breakwaters are being built at these ports to increase their cargo turnover by at least 80 per cent. by 1960. This is part of a scheme to construct a unified waterways system stretching from the Caspian Sea to the Arctic. Several rivers are to be damned or diverted to raise the level of the Volga and one of its main tributaries, and will also make a huge artificial lake in Central Russia.

Reducing Damage to Goods in Transit

British Standard for Handling Instructions

The transport of dangerous goods such as acids is largely covered by regulations designed to protect the people handling them and the materials with which they may come into contact. The carriage of "non-dangerous" goods may also involve damage—of a different kind—to the package and its contents—and it is to minimize this risk that a new British Standard (B.S. 2770) concerned with the handling instructions for such goods, has been published.

The standard recommends the use on containers of pictorial marks which provide at-a-glance instructions to all concerned with the handling of a package during transit. Thus the conventional wording "Fragile—handle with care" is expressed by the stylized symbol of a slender-stemmed wine glass. There are five other marks recommended in the standard, which, it is believed cover, the most important instructions in the language of freight-handling: **"Use no hooks: do not puncture"—"This way up"—"Keep cool: stow away from boilers"—"Sling here"—"Heavy weight this end."**

At the present time packages are often marked with handling instructions in the language of the country of origin but such instructions are of little value elsewhere where a different language is spoken or where the handling personnel cannot read. It is hoped that in time as the new system of sign language becomes more widely known it will ensure the safer delivery of goods from one part of the world to another.

Although the British Standard recommendations are issued for use in the United Kingdom, the need for co-ordination internationally is, of course, recognized and it has been proposed that the International Organization for Standardisation (ISO) should study this subject with a view to preparing internationally acceptable recommendations.

Copies of B.S. 2770 "Recommendations for pictorial marking of handling instructions for non-dangerous goods" are available from the British Standards Institution, 2 Park Street, London, W.1, price 3s. each. The recommended symbols are illustrated in the form of stencil markings so that they provide a basis for the manufacture of suitable stencils.

Manufacturers' Announcements

New Lightweight Radar

What is claimed to be an entirely new model of ship-borne radar equipment was recently demonstrated to the technical press by Messrs. Kelvin & Hughes Ltd.

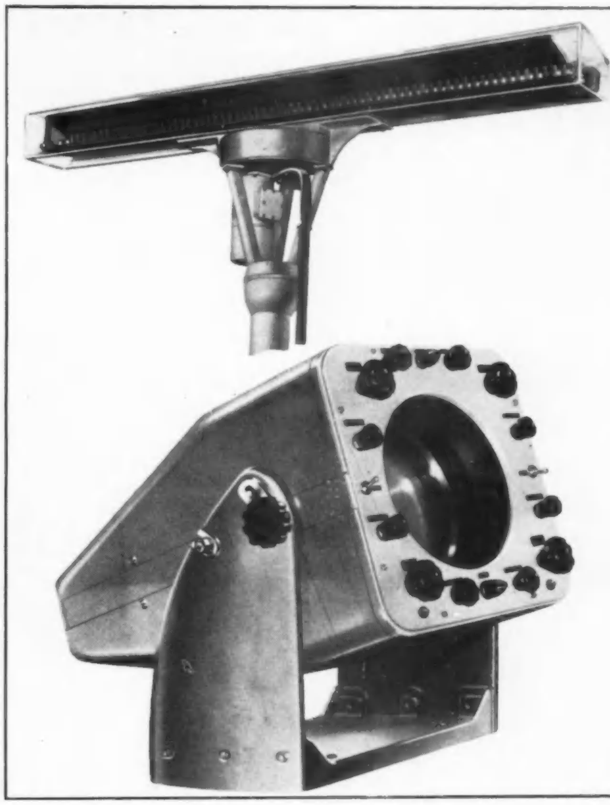
Known as the Type 14 Marine Radar, this new model can be operated from 24 volts, 110 volts or 220 volts D.C. or from A.C. mains in ships using this method of supply.

The scanner incorporates a slotted waveguide radiator which eliminates the necessity for the conventional reflector. The use of this system considerably reduces wind resistance and weight and is stated to improve electrical characteristics and eliminate side-lobe echoes.

The transmitter is a compact unit (16-in. x 15-in. x 9-in.) designed for bulkhead or deckhead mounting. The magnetron provides an output of 60 kw. at a recurrence frequency of 1,100 p.p.s. Two pulse lengths are used to provide solid paints at the longer ranges and clear pictures on the shorter ranges. By the use of magnetic techniques eliminating the need for thermionic valves, the modulator is greatly simplified, thus improving reliability. A neon lamp tuning indicator facilitates tuning of the local oscillator and a built-in performance monitoring device is included.

The display unit incorporates a 9-in. cathode ray tube and is suitable for deckhead, bulkhead or pedestal mounting. The angle of view is adjustable to suit invididual requirements. Five range scales are provided, half-a-mile to three miles (continuously adjustable), six miles, 12 miles, 24 miles, and 48 miles.

The controls are arranged around the built-in viewing hood and



Scanner Unit (above) and Display Unit (below) of the new Radar Type 14.

each is provided with an illuminated identification panel. To obtain optimum results under conditions of clutter, from sea, rain, or snow, a differentiating control as well as swept gain control is provided. A variable range marker as well as calibration rings are available for range mesurements. The local oscillator tuning indicator, the range marker dial, and the indication of the range in use are all visible inside the viewing hood.

The power unit and junction box measures 11½-in. by 11¼-in. by 3½-in. and houses all power supplies other than the valve heater transformers which are located in each individual unit. The start-stop switch, stand-by switch and serial control switch are also mounted on this unit.

The motor generator is designed for direct on-line starting, thus eliminating the conventional control box.

The total installation weighs less than 3 cwt.

An Automatic Fire Pump

An unusual automatically-operated auxiliary fire pump has been installed in the new passenger/cargo motorship "Bonavista" (1,000 tons d.w.), recently completed by Hall Russell & Co., Ltd., Aberdeen, to the order of Canadian National Railways, Montreal.

At the request of the ship's owners, Megator Pumps & Compressors, Ltd., supplied a fire pump set consisting of one of their M50 pumps driven by a Petter AVAI diesel engine. An independent fire pump such as this is normally started up, when necessary, by hand, but in the "Bonavista" it is incorporated in the automatic fire main system.

The fire main is kept under a pressure of 60 p.s.i. by the pressure of air on the top of the water in a small pressure tank. When a fire hose is brought into play the pressure in the main falls until it reaches 40 p.s.i., when a pressure switch automatically closes thus energising the starting relay in the control unit. This operates the Megator pump which delivers water through the tank to the main, to keep two ½-in. jets supplied.

When the fire nozzle is turned off the pressure of water in the system rises to 60 p.s.i. The pressure switch then activates the stopping relay in the control unit, which energises the stopping solonoid linked to the fuel pump rack on the engine.

Manufacturers' Announcements—continued

Three New Launches

Two shallow draft vessels and a pilot launch have recently been delivered by Universal Launches Ltd., of Bideford, North Devon.

The first of the shallow draft vessels is for use in Northern Rhodesia and is powered by twin Perkins P.4 diesel engines. These have been derated to develop 36 h.p. at 2,000 r.p.m. to suit conditions under which the launch will be operating at 3,500-ft. with an ambient temperature of 90° F. and relative humidity of 75 per cent. The vessel has a length of 32-ft. 6-in., a beam of 10-ft. 4-in. and a draft of approximately 18-in. The estimated speed is 12 knots and the fuel capacity 100 gallons.

The 35-ft. launch leaving moorings on Acceptance Trials.

The second vessel will operate on the Zambesi River and Kariba Lake and has a length of 35-ft., a beam of 10-ft. 10-in. and a draft of approximately 2-ft. Twin fins are provided to give additional protection to the propellers and to prevent damage by grounding on sandbanks.

The specification called for a cruising speed of 11/12 knots fully loaded and an intermittent maximum speed of 15 knots. Twin Perkins S.6 diesel motors have therefore been installed and have been derated to operate at 1,500-ft. with an ambient temperature of 150° F. and an assumed humidity of 50/60 per cent. Under these conditions the engines will develop 86.4 h.p. at 2,000 r.p.m. On trial the launch achieved a maximum speed of 20.5 knots with six passengers on board and over 14 knots with an additional load of three tons of ballast.

Because of the draft restrictions both vessels have been fitted with tunnel sterns.

The pilot launch is for service in Dublin Bay and has the following dimensions: length 26-ft., beam 8-ft. 9-in., draft 2-ft. 2-in. (light). Powered by a Parsons Porbeagle diesel motor developing 52 h.p. at 2,250 r.p.m., a service speed of 15 knots can be obtained. The fuel capacity of 65 gallons gives the launch a range of over 300 nautical miles.

Universal Launches Ltd. announce that they are shortly transferring their business to larger premises. In future the firm will operate under the name of Universal Shipyards (Solent) Ltd., and their address will be: Sarisbury Green, Nr. Southampton, Hants.

New Barge Crane

Chamberlain Industries, Ltd., of London, announce the addition of a barge crane to their range of "Staffa" cranes. Originally designed and built for handling stone and slag on river bank consolidation work, the "Staffa" hydraulically-operated barge crane is of lightweight construction and is designed to be installed in a well in the bow of the barge so that both cargo and crane can be covered over. A specially long jib permits the whole of the barge to be unloaded and is also useful where there is insufficient depth of water near the river bank to permit close mooring of the barge The crane consists of a 30-ft. cantilever lattice-type jib, pivoted on an "A" frame, which in turn is mounted on a machinery base. The superstructure carries a Ford four-cylinder diesel engine directly coupled to a Plessey pump with a capacity of 24 gallons per minute. The capacity of the crane is 10 cwt. at 30-ft. radius, with lifting speeds of up to 150-ft. per minute.

Sales of British Cranes in Canada

During the past twelve months, Steels Engineering Products, Ltd., Sunderland, England, manufacturers of Coles mobile cranes, have exported to Canada a number of cranes from their very wide range. Considering the fact that Canada's immediate neighbour is the U.S.A., the home of mechanical handling, not only is this a tribute to British products but it is also assisting in the increase of dollar earnings.

Each crane is powered by either the Coles diesel-electric or petrol-electric system of transmission which is claimed to promote smooth, precise and accurate placing of loads. The safety devices, which are an important feature, are integral with the system and not superimposed, and include totally enclosed dust and weatherproof limit switches fitted to hoist and derrick motions to prevent overwinding and overlowering on the derrick motion and hoisting beyond the prescribed limits.

Many of the most important shipbuilding, oil, engineering and railroad companies in Canada are now using these cranes.

Use of Timber Preservative in Docks

Recent developments in the timber preservation industry are making possible a greater use of timber in dock and harbour structures as well as in sea-defence work. A small but interesting application of the new preservative, Tanalith "C," developed by Hickson's Timber Impregnation Co. (G.B.) Ltd., has been made by British Railways. They have installed a tanalised catamaran in the Ramsden Dock in Barrow-in-Furness. Its purpose is to act as a distance-piece between ship and quayside to prevent vessels grounding on the mud which slopes up to the dock wall. Some 1,500 cu. ft. of timber was used, the sizes ranging from 6-in. x 3-in. to 14-in. x 14-in. Some of the major timbers are more than 30-ft. long.

Catamaran for Barrow-in-Furness.

The work of impregnation was carried out by George Barker & Sons, Ltd., of Backbarrow, for Wellerman Bros. of Sheffield (who built the catamaran). To ensure a good depth of penetration into the resistant Douglas Fir, which was the timber used, all timbers were incised before impregnation with the preservative. Extensive tests have been carried out on Tanalith "C" impregnated timber, and underwater tests have proved treated timber to be immune to attack where untreated timber, over the same test period, was rendered completely useless.

Tanalith impregnation is carried out by a vacuum-pressure process in which the water-borne preservative salt is forced into the timber cells, giving adequate protection in depth. Pressure cylinders of more than 60-ft. in length enable the treatment to be carried out in bulk, thus cutting costs.